THE IRON TRADE REVIEW

VOLUME XXVII. CLEVELAND, O. MAY 10, 1894. CHICAGO, ILL. NUMBER 19.

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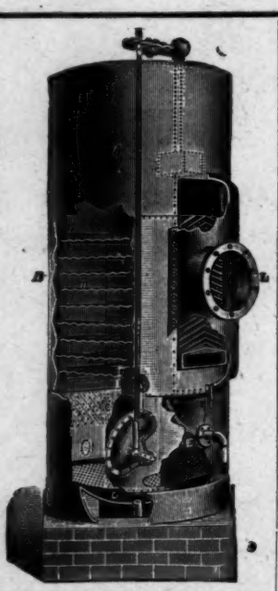

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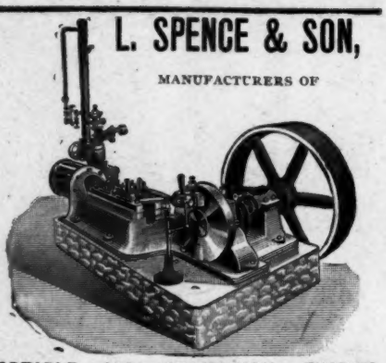

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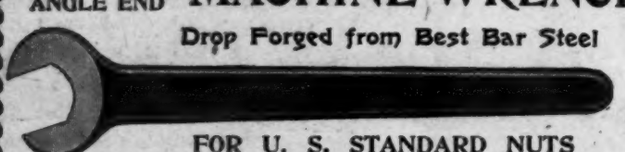

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THE IRON TRADE REVIEW

VOLUME XXVII. CLEVELAND, O. MAY 10, 1894 CHICAGO, ILL. NUMBER 19.

THE WEEK IN IRON CIRCLES.

GENERAL FEATURES.

The effect of the coal and coke strikes upon the iron trade in restricting production, and, in some departments, in advancing prices, is more and more marked. A transaction in Bessemer pig at $12 Pittsburg and billets at $17.75 give some idea of the jump that has been made in a week. The arrangement by which a considerable number of bituminous coal operators will meet the miners in conference in Cleveland on the 15th inst. may result in a basis of settlement which will bring a resumption of coal mining at a majority of the idle plants. But there are contingencies, and signs appear here and there that enough operators will stay out of the conference to make advanced wages by no means general. It is quite probable that even should early agreement come in the conference there will be little coal on the general market before June 1, and it would be some time before blast furnaces could accumulate a sufficient supply to make them safe in starting. In the past week the banking of stacks has gone on, and a number of furnaces in the Birmingham district have been added to the idle list. With some furnace companies the coke strike is made an occasion for repair work and such stacks will be idle for some time after fuel is obtainable. Among foundries the scarcity of coke and the high price of the little obtainable has compelled a shortening of operations and thus consumption as well as production of pig iron is lessened, though it is evident that the latter is much more cut down than the former. There is thus far no change in prices of foundry grades and transactions continue on the retail scale that has plagued furnacemen for these many months. Any hope of strength comes from the probability that furnaces alternating on Bessemer and foundry will resume on a Bessemer burden and thus the supply of foundry iron will be shortened. In some instances steel works have suspended operations on account of fuel trouble, but in the Pittsburg district nearly all continue in operation. Billets are well-nigh unobtainable for prompt delivery and prices have advanced, sales of small lots ranging from $17.25 to $17.75. In the East, spot deliveries command $19. Mills that have natural gas or are equipped for oil have profited by the coal strike, and on prompt shipments have been able to get a trifle better prices on finished material, with the exception of bar iron, which shows no sign of strength. Eastern mills that are able to get fuel have had a good run of business, orders that have been going to the West, being now available to them. They are quoting higher figures, tank plates, for example, being 1.30c delivered. On old material, prices are firmer in the East. In the chief Western market, the only feature of interest is the placing of orders for steel rails. The amount involved would ordinarily be of little moment, but in view of the beggarly buying of railroads of late, all their contributions to the market become significant. There is a disposition in all quarters to take a hopeful view of the effect of the fuel strike and to believe that it will permit of a cleaning up, from which a better basis of operations may be expected. Little complaint has been heard, of late, in the East and the Central West, about uneven adjustments of railroad rates on iron; but some lively cutting has been going on, farther west. As a result, a heavy open slash has been made on "iron and steel articles," going into effect May 10. This cuts the rate from St. Louis to Kansas City from 20c to 7½c and between Chicago and Kansas City from 25c to 12½c. From St. Louis to Denver and common points the cut is from 50c to 20c.

THE CLEVELAND OUTLOOK.

The fuel trouble, as it affects vesselmen, has reached a more acute stage, and the added cost of coal and the lessening of the number of carriers have resulted in 80 cent trip charters from the head of the lakes. Yet the added $1 a ton in the cost of coal is not compensated for by a 5-cent advance on Lake Superior ore, and the brunt of the situation falls upon the carriers. No ore sales are to be reported for the week, though some negotiations are pending that will add further transactions to the Bessemer column. The prospect of a steady demand for Bessemer pig iron, when the fuel siege is over, will cause certain valley furnaces that have large stocks of foundry iron on hand, to start up on Bessemer, and where only non-Bessemers have been in the furnace yard for some time Bessemer ores will be bought. The developments of the past week in the mining region indicate that the low wage basis is not to continue long, if the men can help it; it is also made plain that mining companies are not in position to increase their cost in any particular. The resumption of operations at the Tilden and the Chapin means the marketing of that much more old-range ore to the exclusion of Mesabi ores, since much of the Chapin's product goes into Bessemer mixtures.

Pig Iron. A 1,500-ton transaction in Bessemer pig was made early in the week at $11.25 Valley furnace but an offer of the same price for 1,800 tons additional was refused. At Pittsburg a 10,000-ton sale, prompt delivery, is reported at $12, equivalent to $11.40 valley furnace. This takes in iron that has long been held for a price. Earlier in a week a sale of 1,000 tons was made at $11.10 valley furnace. There is practically no Bessemer iron on the market today in either valley, and Pittsburg spot transactions will be limited to the small amounts in the hands of brokers. Prices are thus almost entirely gauged by the anxiety of the buyer. Furnace banking has taken in the Wheeling district and in one or two instances steel works there are inactive. Foundry iron is not yet affected by shortened production, but sellers look for some firmness later on. Several hundred tons have been sold in this market in the week on a basis of $10 valley furnace for No. 2 and $11 for No. 1. Yet these prices are shaded.

Finished Material. The firmer prices noted last week for plates and building material are maintained and the advance in Bessemer and billets has stiffened sellers' views. However, competition is close, and here and there an inside figure is heard of. Building prospects in this market and the tributary district will call for a large tonnage of structural steel. Considerable bridge material has been bought in the week. Beams and channels are quoted 1.25c. and 1.30c.; plates, 1.15c.@1.20c. for tank. Sheets show more activity and sellers are holding for full price. Quotations are on the basis of $2.35 for No. 27.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

There is very little change in the situation from last week, the only subject of interest being the shortage of fuel among manufacturers. Dealers in coke have been much sought after in the past week and buyers have been very anxious to place their orders and to get shipments immediately. So far only a few shut downs have been made because of the lack of fuel, but it is a question how much longer a great many of the manufacturers can hold out. In pig iron very little has been done and orders have been limited to small lots. By far the largest sales of the week were made in rails, and finished material seems to be doing better than any other branch of the market.

PIG IRON.—No orders of any size have been taken for any class of iron, either Northern or Southern. The bulk of orders received have been for car loads, but a few have run as high as 200 tons. The aggregate is probably no larger, if it is as large as in the week before. Prices have not changed, but it is expected that they may be advanced within the next few weeks unless the supply of fuel is increased by the abandonment of the strike. There are one or two inquiries in the market for large lots of iron, but it is doubtful if they will be closed up within the next week. Aside from this everything is very quiet.

BARS.—Orders have been few and far between and very limited in size. Quotations are continued at 1.10c to 1.15c for iron and 1.10c, to 1.25c, according to quality, for steel bars.

STRUCTURAL MATERIAL.—The past week has been very quiet, with no orders of any size closed. Quotations are as follows: Beams and channels, 1.40c to 1.45c; angles, 1.40c to 1.45c; plates, 1.35c to 1.40c; tees, 1.60c to 1.65c. Quotations from stock are from 10c to 15c higher.

RAILS AND TRACK SUPPLIES.—Several good sized orders for rails have been received within the past week, among them one for 12,500 tons from St. Louis. There are still a number of large deals in the market and it is probable that the next few weeks will show quite a good tonnage closed. Quotations are unchanged. Rails, $25 to $27; splice bars, 1.40c; track bolts, 2.30c to 2.40c; spikes, 1.75c to 1.80c.

BILLETS AND RODS.—There is no change in the situation and no sales of either billets or rods have been made in the past week. Quotations are nominally $17.25 for billets and $26.50 for rods.

PLATES.—The inquiry is still large for boiler plates, but no very large contracts have been taken within the past week. Prices are the same as last reported. Tank steel, 1.35c to 1.40c; flange steel, 1.65c to 1.75c; fire box steel, 3.75c to 4c; boiler tubes, 75 per cent. discount.

MERCHANT STEEL.—The market is very quiet, and the only subject of interest is tool steel, for which there is a good inquiry. Quotations are made as follows: Open-hearth spring, machinery and tire steel, 1.85c to 1.90c; crucible spring, 3.50c; machinery, 4.50c to 4.75c; tool steel, 6½c and upwards.

SHEETS.—Black sheets show some activity and several sales for moderate amounts have been made recently. Prices are still made at 2.35c to 2.40c for No. 27 common. Galvanized iron is in rather smaller demand, with only a few small sales closed. Quotations are made at 77½ per cent. and 80 per cent. discount, on mill shipments.

OLD RAILS AND WHEELS—A sale of 500 tons of old iron rails was made, in the past week for delivery out of the city; the price could not be obtained. Quotations are nominally as follows: Old iron rails, $10; old steel rails, $7 to $10, according to length, etc.; old wheels, $10.50 to $10.50.

SCRAP.—Business has been very quiet for the past week, with only a few small sales closed. No change is made in quotations. No. 1 forge, $9; No. 1 mill, $6 to $6.50; No. 1 machinery, $7; axles, $13, cast borings, $3 50; wrought turnings, $4; axle turnings, $5.50; mixed steel, $5; coil steel, $7; leaf steel, $8; locomotive tires, $8; heavy cast, $7; stove plate, $5.

GENERAL MARKET RESUME.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. The Connellsville region shows a more complete stoppage of operations than at any time since the second strike began. The Rainey works, which operated nearly full last week, are for the most part idle, though strenuous efforts are being made, with the help of U. S. deputy marshals, to prevent the gathering of strikers to interfere with the men. The Frick Co. will also make an attempt to start. The steel mills here are all in operation, but the price of coke makes it impossible for some to run at a profit. Gas and crude oil are helping out those equipped to use them. On the Ohio river one or two steel plants have stopped from inability to get fuel. Bessemer pig has sold at $11, valley furnace, in the week, and one transaction was made at $11.10, equivalent to $11.70, Pittsburg. Steel billets have sold in small lots, prompt delivery, at whatever buyer and seller could agree upon, and prices have ranged from $17.25 to $17.75. Finished material is naturally firm, but the advances are not pronounced. Beams are held at a minimum of 1.20c. Pittsburg, and 1.30c. is the price on small orders. The demand is only fair. Plates show an advance of about $2 from the lowest prices touched.

Cincinnati. It has been a very quiet week in every branch of the crude iron trade excepting Bessemer pig. The latter has shown an advance of $1.50 a ton. In foundry and forge irons no improvement is yet felt. There is certainly no change in the general condition of business to warrant any improvement, as consumers of all classes are dull and buying but little. Should the suspension of furnaces last long, however, the effect must be felt on the market as stocks are not large anywhere, and a certain consumption of at least 100,000 tons per week is going on. Buyers refuse to be alarmed in the least degree about any scarcity, and yet it is a fact that certain standard grades of iron are already scarce, and if different general conditions surrounded the situation, a sharp advance could be easily scored. Agricultural implement makers are cutting their season shorter than usual, and some of the largest are about to close down, having made up all the stock they think prudent. Stove men have also generally accumulated considerable finished stock. Cast iron works still continue busy and the kindred lines of pipe, pumping machinery, etc., for municipal improvements are pretty well occupied. Jobbing foundries, machine foundries and the like are all very dull.

Buffalo. We note a little hardening in prices. Nothing that may be called an advance, but a greater uniformity in quotations, which is brought about by the withdrawal of several furnaces from the market. Within two weeks probably every coke furnace which can reach the Buffalo and New York market will be out of blast. This enforced stoppage is generally considered the best thing that could happen to the trade, next to the influence which might increase the consumption of pig iron. Demand is in no manner improved. Bessemer pig iron has advanced $1 to $1.50 per ton.

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MAY 10, 1894.

ONE CLAIM FOR FREE IRON ORE.

Baltimore's interest in free iron ore is set forth by the Baltimore *News* under two heads. In the first place, it is argued, Baltimore "is in every way fitted to become the center of a very important iron manufacturing industry," since it is the seaboard city nearest the great fuel regions of Maryland, West Virginia and Pennsylvania, is near to excellent lime stone deposits and within easy reach of the Eastern pig iron market. The second point made is that if Baltimore could become the entry port for a large tonnage of free iron ore, it could export large amounts of coal to the West Indies and Central America, as return cargoes. "The West Indies want our coal," the *News* says, "but will not take it unless trade can be made reciprocal." It goes somewhat against this assertion, however, for our contemporary to say, in the same paragraph, that the value of this coal traffic may be judged from the fact that in 1892, 103,773 tons of coal were exported from Baltimore and in 1893, 165,258 tons—all this with the iron ore duty in force. That this export should have increased 60 per cent. while the imports of iron ore to the country decreased from 806,585 tons in 1892 to 526,951 tons in 1893, scarcely tends to show the relation between ore imports and coal exports, on which it lays such stress.

As for the establishment of the steel works at Sparrow's Point, which is pointed to in proof of the advantages of the Baltimore district, that step was taken in full view of the 75 cent duty on iron ore. This enormous investment was made with no hope or expectation that the duty on iron ore would be removed. Why should weight be given to a prospective and hypothetical expansion of the seaboard iron industry, in the event of the removal of the duty?

Why should this contingent and suppositious quickening of iron making on the seaboard weigh against millions of capital already invested in iron mining and in iron ore transportation, which would be directly struck at by putting iron ore on the free list? Moreover, the iron industry of the United States, when it had a *situs* close to the seaboard was given the benefit of all the protection it desired in order that it might develop and prosper. Now that the scepter has passed westward and this protective scheme becomes inconvenient in spots, we have the spectacle of an outdated seaboard industry asking to be re-galvanized at the expense of established interior industries. The paper we have quoted admits the passing of Baltimore's pig iron industry in this sentence:

> Baltimore has long been the seat of a considerable pig iron industry, but the conditions under which it grew and prospered have passed away with the growth of competing regions, and the last of the furnaces in this immediate vicinity is now cold.

Is it not the acme of selfishness and inconsistency to ask that the self-same tariff laws under which that industry maintained itself in its days of prosperity, be annulled because they now operate to the benefit of other sections?

THE SOUTH'S INDUSTRIAL PERSPECTIVE.

A Southern trade paper that has long been afflicted with an acute case of—"veraphobia," let us say, may be expected to go into a fresh paroxysm over some figures from the census of 1890, presented in Senator Quay's tariff speech. The special kind of truth at which the paper in question takes affright is facts relating to Southern industrial progress. Complicated with the disease mentioned, it has chronic *megalopsia Australis*—enlarged vision of things Southern. It has never been satisfied to have the wonderful industrial development of the South properly acknowledged and rated at par. An industry south of the Ohio must needs count for one and-a-half or two of Eastern or Western *situs*. The iron industry of the Southern States, for example, it has persistently held up as beyond all parallel and, in late years, as having outstripped that of any other section. Southern furnaces we were told, led the van in times of large output and in a time of depression, like last year, were far less affected by money stringency or curtailed demand. When *The Iron Trade Review* pointed out, in connection with Mr. Swank's statistics of pig iron production for 1893 that the South made 20.6 per cent. of the pig iron of 1891 and 1892 and 22 per cent. of the total for 1893, and remarked that this slight difference scarcely bore out the claims of some of the boomers, there was a tirade of foam-flecked Billingsgate from our megaloptic contemporary.

We know the risk is great; but seeing that the Census Bureau, which compiled the figures, and Senator Quay, who read them in the Senate, have survived, we venture to reproduce the table which Senator Quay used to compare Pennsylvania's industrial status with that of the 14 Southern States of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Virginia and West Virginia. It makes the following significant showing of their manufacturing industries, alongside those of Pennsylvania:

	Pennsylvania.	Fourteen States named.
Establishments	39,366	62,625
Capital	$990,999,375	$772,564,909
Expenses	$74,833,862	$81,558,276
Employes	620,484	668,573
Wages	$305,556,229	$265,237,810
Cost of materials	$773,530,105	$614,733,364
Value of product	$1,331,523,101	$1,131,721,745

From these figures it will be seen that Pennsylvania, with less than two thirds the establishments of the 14 States in question, has about $218,000,000 more capital invested, spends $160,000,000 more for materials, and turns out a finished product worth $200,000,000 more. And yet the manufacturing interests of a single State out of the 14—no matter that it stood at the foot of the column—have had more weight in determining the character of the new tariff bill than all the towering industries of Pennsylvania put together.

THE COMPROMISE TARIFF BILL.

Three metal schedules have already found place in the columns of journals devoted to the iron industry. The first publication was made on the reporting of the Wilson bill to the House; another was made necessary by amendments adopted by the House in committee of the whole; a third came with the presentation of the bill to the Senate by the Committee on Finance, after a two months' struggle with the House bill. And now that something over a month has elapsed since Senator Voorhees called the bill up in the Senate for debate, we have another set of amendments to the metal and other schedules. These were reported to the Senate on Monday in the "compromise bill" on which certain members of the minority had been at work more than a fortnight. In all, 403 changes have been made from the Finance Committee's bill, and in nearly every instance they increase the duty. Iron and steel manufacturers, while they are not given such protection as they need, have fared better than some of them had reason to expect.

It would be useless to hazard any predictions on the form in which the bill will finally get back to the House. Certainly Chairman Wilson will not know it. That it will yet be altered in many particulars before the Senate passes it, is entirely probable. But there need be no advance gratulation, in the belief that the bill has been shorn of much of its capacity for harm. The evident object of the compromise is to get a bill through the Senate as speedily as possible, even though it stultify a sub-committee that essayed to fix tariff rates without hearing from the manufacturers affected. Then the tug will come in the conference committee and many of the 403 steps toward protection will be retraced—probably most of them. It does not appear, when one considers what the attitude of the House will be toward these changes, that they have greatly improved the prospects of ultimate agreement. The chief alterations made in the metal schedule are as follows:

The duty on pig iron, ferro-manganese, scrap iron, scrap steel, etc., is fixed at $4 a ton; Senate bill and House bill 22½ per cent; McKinley bill $6.72 a ton.

Beams, channels, angles, etc., 6–10c a pound; Senate bill 35 per cent; House bill, 30 per cent; McKinley bill 9–10c a pound.

Railway bars of iron and steel, 7–20c a pound; Senate bill, 22½ per cent; House bill, 20 per cent; McKinley bill 6–10c a pound.

Boiler or other plate iron, skelp iron and steel, etc., not thinner than No. 10 wire gauge, valued at 1c a pound or less, 5–10c a pound; Senate bill 30 per cent; House bill 30 per cent; McKinley bill, 5–10c. On other values, a proportionate increase.

Forgings of iron or steel, 1½c a pound; Senate and House bills, 30 per cent; McKinley bill, 2 3–10c.

Under the head of manufactures of iron and steel several changes for the better are made: Anvils, from 25 per cent to 1¾c a pound, the McKinley bill being 2½c; boiler tubes, from 20 per cent to 1¾c against 2½c in the McKinley bill; bolts, from 25 per cent to 1½c, McKinley bill 2¼c; cast iron pipe, from 22½ per cent to 6–10c a pound, McKinley bill 9–10c; cast iron vessels, stove plates, parts of machinery, etc., 8–10c a pound, Senate and House bills 25 per cent, McKinley bill 1 2–10c; castings of malleable iron, 9–10c, Senate and House bills 25 per cent, McKinley bill 1 3–10c; cast hollow ware 2c a pound, Senate and House bills 30 per cent, McKinley bill 3c.

The tin plate duty, which the Senate committee reduced from 1 1-5c to 1c is put back to the Wilson bill figure. Tin plate manufacturers who interviewed Senators Voorhees and Harris, had some hope of better things, but it was hardly to be expected that the 1¾c duty which they considered necessary, would meet the views of Senators who had denied hearings to important industries.

It will be noticed in the changes given above that the Senate compromise has been constructed, as far as the metal schedule is concerned, with direct reference to the McKinley act. The duties in the latter have been cut about one-third in every instance. The conspicuous fact, however, is the discarding, in these items, of the ad valorem feature and the substitution of specific rates. Yet in all other portions of the metal schedule the ad valorem duties are retained. Thus patchwork is added to patchwork, and the wonder grows how such a monstrosity can be soberly proposed for a place upon the national statute books.

THE SOFT COAL SITUATION.

A good deal of importance has been attached, in daily press telegrams and comments, to the convention of bituminous coal operators and miners appointed for May 15, in Cleveland. Yet there is an opinion among not a few shippers of Ohio and Western Pennsylvania coal that this meeting will not settle the strike. The manner in which the call was issued and the fact that on the operators' side the initiative was taken by a single representative of an Ohio district, added to the keen competition that has long been waged between Pittsburg and Ohio operators for the trade of the Northwest, suggest that the Cleveland meeting will fall far short of unison on the operators' side. From the present outlook it seems impossible that a general price will be agreed upon for mining. The machine-mining men are interested in having the price advanced, since the low wage basis prevailing of late has well-nigh eliminated any advantage they have had over pick-mining.

It is plain that several important producers in the Pittsburg district will not go into an arrangement for a general price, on the basis of a 9-cent differential between Ohio and Pennsylvania, and the indications are that Illinois, also, will hold aloof from a general arrangement. Moreover, the anxiety of certain shippers interested in Northwestern docks to have mining brought up to 79 cents in Pennsylvania, in order that the depreciation on heavy coal stocks on these docks may be as little as possible, is not shared by their competitors. It is evident that there will be a variance of views and interests that presents serious obstacles to an inter-State agreement. Pittsburg operators meet on Friday, May 11, to decide whether they will take part in the Cleveland convention, and if so, what their attitude will be.

A FRESH illustration of the figure often cut by unusual concessions in railroad freights, in diverting trade from customary markets is shown in recent California transactions in finished iron. The Southern Pacific Railroad recently reduced freight rates on iron, to compete with the water rate from New York, and, as rail shipments are preferred, this has permitted the Alabama Rolling Mill Co., of Birmingham, Ala., to sell 1,200 to 1,400 tons of iron to California consumers in the past three months. The water rate to New York is about 45c. per 100 lbs. One shipment made by the firm mentioned within a short time was a train load of bar, band and hoop iron, consigned to a San Francisco buyer.

TROUBLES at Lake Superior ore docks are settled.

AMONG THE IRON MINES.

The Chapin mine, at Iron Mountain, Mich., resumed on Thursday, May 3, with a considerable force of men, and it is expected to have 500 at work when operations are fairly under way. The resumption was most opportune, with hundreds of men in Iron Mountain face to face with starvation; and while it was expected that the big mine would start up this season, the condition of the men accelerated matters. At present, operations are nominally conducted under the name of the old company, but M. A. Hanna & Co., of Cleveland, are furnishing the means and what is done is under their direction. An arrangement has been made by which no royalty is paid on the ore taken out this season. A Milwaukee dispatch of May 2 notes the sale by the Wisconsin Marine & Fire Insurance Co. Bank, of 40,007 shares of stock, hypothecated by Schlesinger. The price was $1 a share. A sale made under similar circumstances the preceding week was at 10 cents a share. It is difficult to see on what basis the $1 bid was made, as the Chapin property is so completely covered by bonded indebtedness that there can be little or no value in the stock. It is expected that a reorganization of the company will soon be effected. No sale of the ore has been made, but the last transactions, involving ore in the trustee's hands, were at $2.50 a ton, one-third Chapin and two-thirds Rex, or the second grade ore. This was last Summer. The 40,007 shares of stock, sold at Milwaukee, were bid in by A. M. Helmer, representing parties to the proposed reorganization. There are 80,000 shares in all.

Receivers Rand and Morris, of the Penokee & Gogebic Consolidated Mines, who have had a force of men at work loading from Colby stockpiles for a few weeks, have arranged for the mining of ore in one shaft of the Tilden. It is expected that something like 100,000 tons will be taken out.

The troubles on the Mesabi range, noted last week, ended in riots and the sending of militia to Virginia. One striker was killed by the Sheriff. The 300 Franklin strikers' demand of $1.50 a day for surface work and $1.65 underground, led to the shutting down of the mine. Mr. James Corrigan, who was on the ground, said that the owners could not afford to pay more than the men had been getting, which permitted them to make $1 and $1.25 a day. Work has been resumed at the Auburn, Norman and Oliver properties, where the men were forced out by strikers.

Ore shipments from Two Harbors for the week ending May 3 were 30,633 tons. Total for the season 60,534 tons, of which 43,044 tons were Vermilion, and 17,490 Mesabi.

The Grant-Chase holdings in Consolidated Mines properties on the Mesabi were purchased recently by Rockefeller agents at a figure much less than he paid for the Merritt stocks transferred to him a few months ago.

To End the Coal Strike—The Coke Situation.

A call for a national convention of coal operators and miners in Cleveland, May 15, was issued as the result of a conference at Pittsburg, May 3, of prominent operators with President McBride and other officers of the United Mine Workers' Association. The wage question was not discussed at the Pittsburg meeting. While the operators present did not represent anybody but their respective companies, it is believed that they will be instrumental in getting a large majority of employers to attend the Cleveland conference, and the hope is that the agreement there reached will be accepted by practically all the operators and men connected with mines now idle.

Reports from the Connellsville region show that in the week ending April 28, 50,196 tons of coke were produced and 2,926 cars were shipped, the figure in each case being about half that for the week previous. The W. J. Rainey works made more coke than before the strike began. This led to other operators notifying their men, who were out, that if the Rainey employes staid at work these operators would start their plants at all hazards. A descent upon one Rainey plant resulted and operations were somewhat curtailed, but work was resumed later. Last week the output of the Connellsville region was still further reduced and in addition to the Rainey plants, Valley, of the Frick Coke Co., and United No. 2 of the United Coal & Coke Co. were the only ones active. Prices have advanced and foundry coke in Eastern markets has almost doubled. Pocahontas coke is finding an increased market among furnacemen. The Illinois Steel Co. has largely drawn upon the West Virginia field since the Connellsville supply was cut off.

The strikers succeeded on Monday in getting most of the men at the Rainey plants out. Meantime deputy U. S. marshals were busy serving notices on the leaders to keep away from the properties. The Frick Coke Co. is to follow the policy it adopted in the other strike, of concentrating men on one works at a time until operations are resumed there in full. The most important development of Tuesday was the bringing in of 56 new men from outside the region at Southwest plant No. 1.

Western Foundrymen's Association.

The annual meeting of the Western Foundrymen's Association will be held on Wednesday, May 16, at 7:30 P. M., in room 701, Western Union Bldg., Chicago. Members are requested to notice the change in place. The business of the meeting will include the election of officers for the ensuing year.

Two papers will be presented: One by Mr. H. L. Hollis, on the "Chemical Differences of Some Russian, German and American Castings," and one by Mr. Thos. D. West, on the "Utility of Transverse, Tensile and Impact Tests for Cast Iron, and Round vs. Square Test Bars."

Because of the election of officers, it is especially requested that all members of the Association be present, and to non-members a cordial invitation is extended to be present and take part in the discussions of the papers.

Personal.

C. F. Rand, Esq., one of the receivers of the Penokee and Gogebic Consolidated Mines, and at the last annual meeting elected president of the Spanish-American Iron Co., is in Cuba inspecting the properties of the latter company.

Campbell B. Herron, the well known Pittsburg iron manufacturer, member of the firm of Spang, Chalfant & Co., and president of the Spang Steel & Iron Co., died May 5, aged 65. He was chairman of the Wrought Iron Pipe Association.

Abraham Garrison, a pioneer in Western Pennsylvania, and for 40 years manager of A. Garrison & Co., founders, is very ill at his home in Pittsburg. He is 90 years old.

It is reported that Mr. C. H. Domhoff will retire from the firm of Matthew, Addy & Co., of Cincinnati, on June 1st.

Mr. E. A. Hyde, formerly of the firm of Forsyth, Hyde & Co., of Chicago, has opened up an office for the sale of pig iron, in room 808, Medinah Building, Chicago.

MESSRS. Backman & Forsyth have recently moved their office from the Rookery, to room 910 Medinah Building, Chicago. In this new office they have a great deal more room and are very pleasantly situated, and will be better able to take care of the business coming to them than they were in their former cramped location.

THE Paige Tube Co. made an issue of bonds some time ago for the purpose of extending its plant, but has decided not to carry out its plans until there is a more distinct improvement in the situation. For the present its mills, at Warren, O., are closed down for lack of coal.

THE Newberry Furnace Co. write us that their charcoal furnace at Newberry, Mich., will go out of blast about May 25th, when the ore supply on hand will be used up. They have a large supply of iron on hand for which there are no orders at present, and operations will not be resumed until there is a change for the better.

THE Inland Steel Co., of Chicago Heights, Ill., announce that they are not dependent upon coal for fuel, as their furnaces are adapted to either coal or oil. Their mill will be running steadily through the strike, and they are prepared to roll promptly any orders sent them.

E. C. ROBERTSON, of Cincinnati, has removed his sales agency for Southern timber and mineral lands from 170 Race street to Room 1007 in the Neave Building, corner of Race and Fourth streets.

AUTOMATIC MUCK BAR SHEAR.

In the process of rolling iron and steel into thin sheets, it would be impracticable to roll each sheet separately, as it would not retain its heat, and the following method, familiar to sheet-mill operators, is adopted:

A billet of sufficient size to make a large number of sheets is heated and passed a number of times through a train of rolls, each pass lengthening the bar and reducing its size. It leaves these rolls in the form of a bar 20 or 30 feet long and something like an inch thick by eight inches wide, these dimensions depending upon the size and gauge of the sheets to be made. These bars are cut up into uniform lengths, and each piece is then repeatedly re-rolled and folded over, each rolling operation reducing the thickness and increasing the linear dimensions; and each folding doubling the number of sheets in the final pack. After the last rolling, the ends of the pack are sheared, leaving each sheet free to be separated.

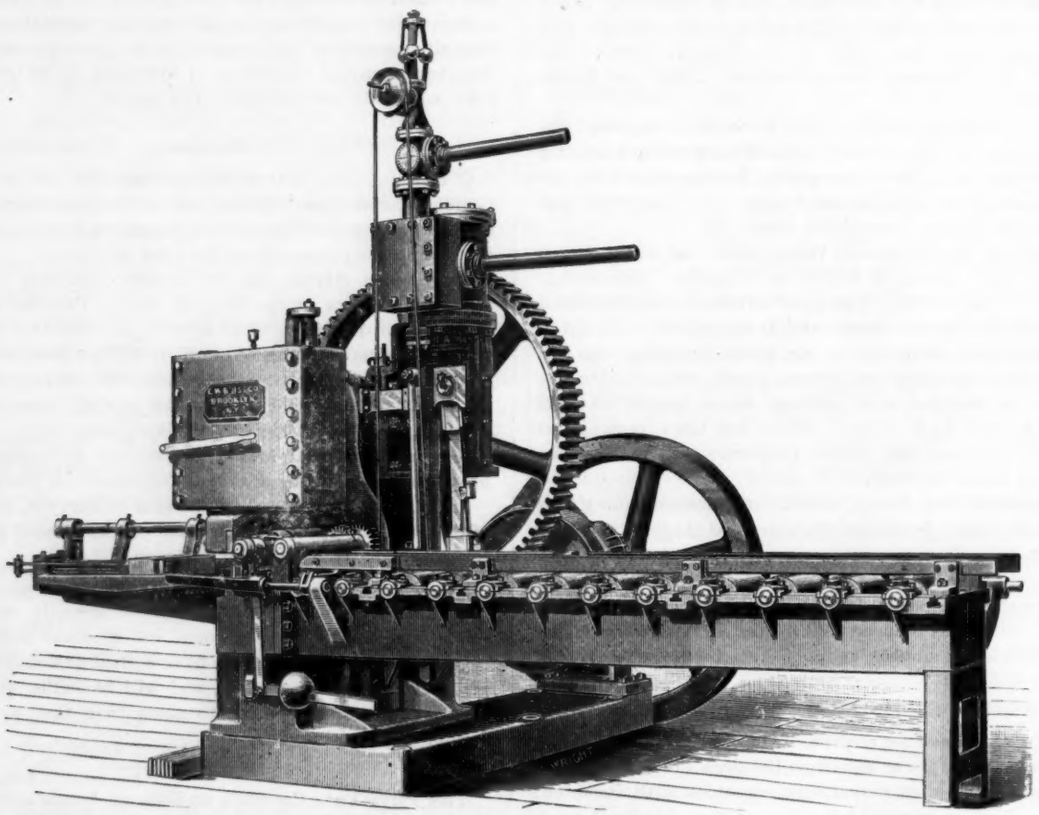
It is very important that the pieces into which the muck bar is cut should be of uniform size, and squarely cut, as upon this depends the size and form of the subsequent pack, and it will easily be seen that any error will be largely exaggerated with the successive passes through the rolls. The method heretofore employed for shearing the muck bar has been to carry the bar to the old-fashioned alligator shear, place the end against a fixed gauge, which determined the length of the pieces, and pass the bar along by hand for the successive cuts. This method not only requires the labor of several men to handle the bar, but calls for considerable skill on the part of the shearman, and unless great care is used the results are liable to be unsatisfactory.

The illustration represents a machine designed by the E. W. Bliss Co., of Brooklyn, for doing the work automatically, thus requiring but one man to do the work, who need not be a skilled shearman. The machine consists of a powerful gate shear driven directly by an engine. A clutch is attached to the engine shaft which can be operated either by hand or automatically. To the right of the machine is a carrier composed of a train of rolls driven continuously. The muck bar coming hot from the rolls is placed upon these carriers, which propel it toward the cutters between side gauges which keep it in position at right angles to the shear blades. Just before entering between the cutters a pair of feed rolls take hold of the bar so as to feed it positively.

A clamping device is placed in the path of the bar and so arranged with a lever that the progress of the bar may be arrested by the operator. This lever also controls the feed rolls, so that when the clamps are in contact with the bar the rolls are removed from it, and vice versa. This arrangement gives the operator full control over the bar, and he is enabled to bring it into proper position to square off the ragged end, by throwing the clutch into operation by means of the hand lever shown in cut at the front of the cutter housing.

When the forward end of the bar has been squared, the operator raises the clamp lever, and the bar feeds forward. An adjustable gauge is placed in its path, and upon striking this its progress is arrested, and the clutch is automatically thrown into operation, causing the shear (upper) blade to descend and cut off the first length. As soon as this occurs, the piece drops out, the shear blade ascends to its upper position and stops, while the bar again feeds forward, and the operation is repeated until the bar is all cut to lengths. By this system the bars are cut accurately and as rapidly as they come from the rolls.

In order to adapt the machine to the practical requirements of mill work, experiments were conducted for some time by the makers, at the mills of the Canonsburg (Pa.) Iron & Steel Co., and this machine is the outcome of these experiments.



AUTOMATIC MUCK BAR SHEAR.

There are several of these machines in operation and they are satisfactorily performing every duty required of them. The makers may be addressed at 138 Plymouth st., Brooklyn, for details of construction and operation of these machines.

MAY magazines: "The Ethics of Democracy," contributed by F. J. Stimson to *Scribner's Magazine*, is particularly significant at the present time. "Working Girls' Clubs" by Clara Sidney Davidge and "The American Congo," by Capt. John G. Bourke, are worthy of note. In the *Century* art plays a conspicuous part. Wm. A. Coffin introduces to American readers Dagnan Bouveret, one of the most admired of contemporary French painters, and several illustrations are given, showing the grounds of the artist's popularity. The editorial department discusses "What Is Political Economy," "The Foreign Element in Trades Unions" and "Popular Education in Citizenship." *Outing* is particularly seasonable and is well illustrated. "Sketching Among the Crow Indians," "A Parisian Fishing Ground" and "Sharp Time on the Mattawa" are chief in interest.

FOUNDRYMEN'S ASSOCIATION.

The monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club, Philadelphia, Wednesday evening, May 2, with 35 members and others present. Secretary Evans presented the report of the Executive Committee, which met April 16. The report said that the committee was favorably impressed with the discussion which had been had on chemistry in foundry practice, and believed that good results would come finally, but the subject is a little too deep at present. "The average foundryman does not understand the matter of chemistry from his point of view. The foundryman selects his iron by fracture and general appearance, and then finds how strong it is with testing machines. And as all orders and specifications for castings are given out subject to strength only, as a rule, the expense of chemistry is not necessary. How long this will last we do not know; but it seems that sooner or later it will follow in the footsteps of carwheels and steel, whose success is entirely due to chemistry. These discussions form the most interesting part of our meetings, and if members would come booked up on some idea, and say something, the roll of membership would no doubt increase.

Thomas D. West, of Sharpsville, Pa., was then introduced, and read the paper, given elsewhere, reviewing "Keep's Test.'

At the conclusion of the reading, Mr. Matlack asked: "What is the size of your round bars?" and Mr. West replied that he made them a foot long.

Mr. Matlack: "Have you considered the bar used by the Brown & Sharpe Co.? It is a square bar 1⅛″ at one end and ⅞″ at the other, so that when it is cast on end, you get a bar one inch square, very close to centre. Another mentioned in the specifications by the water works is 1x2 inches, 26 inches long and 24 inches between supports. These are for transverse tests."

Mr. West: "I do not wish to commit myself this evening as to the outline I mean to follow in adopting my round bar. I am preparing a paper now, and after this question is taken up, the wonder will be why this was not done before."

Mr. Outerbridge, of William Sellers Co.: "I endorse Mr. West's statements as the result of my own experience. I have invariably found when comparative test bars are poured in the same mould from the same pattern and same size, the strength, instead of increasing as the iron cools, as Mr. Keep claims, really decreases. I am surprised at Mr. Keep's statement, and wrote him on the subject. He held to his statement. I have found the opposite result. The bars I have used have been 1″x½″, cast 15 inches long. I agree with Mr. West that iron grows weaker as it grows cooler, and the strong casting is made from hot iron. I have always found that if you do not introduce any extraneous element the iron grows weaker as it cools. Now, Keep's strong bar was stirred in the melting with a steel bar. It is quite possible that a certain percentage of the steel communicated with the iron and thereby strengthened it. It is generally conceded that 5 per cent. of steel has a strength equal to 20 per cent. of white pig iron."

Mr. Matlack: "Mr. Keep did not use a steel bar in stirring, but a pair of tongs."

Mr. Outerbridge: "Well, cast iron tongs. That's about the same thing. Speaking in regard to one of his tests, Mr. Keep specifically states that it was not stirred, but simply remained in the ladle. Test No. 778 showed phenomenal strength, 520 pounds, I think, for a ½″ bar on a 12 inch piece, and the companion piece poured a few minutes before, probably 100 pounds less."

Mr. West: "In speaking of the round bar 1 foot long, I meant at points of support."

Mr. Flagg asked Mr. Outerbridge whether the two bars mentioned give comparative tests, as Mr. Keep drew attention to the fact that one could not pour various sized test bars. "I have had a talk with Mr. Keep in regard to his test bar, and he declares that the iron tongs, used by him in stirring, were hardly touched and showed no burning."

Mr. Outerbridge: "The companion bars were cast from the same pattern. There were yokes at the end, the same as Keep uses. The pieces are always calipered and planed for accurate work. I recently made a cube 15 inches long, and 14x14. This I cut up into 54 parallel bars 1 inch square, numbering each bar and its position in the cube. I broke them all, and found that those from the center of the cube were weakest. The companion bars in these cases were poured from the same pattern and mould."

Mr. Flagg: "Could you reason from the strength of the ½ inch bar the strength of the inch bar?"

Mr. Outerbridge: "The ratio would be about 8 to 1." Turning to the question of tensile strength, Mr. Outerbridge said: "There is a definite relation between transverse and tensile strength. It is not uniform for all characters of iron. The relation between a transverse bar of square iron, 12-inch pull, is 12 to 1. With an increase in the strength of the metal the ratio rises according to the character of the iron. What did it do with Keep's? The pull on a one inch bar was 40,000 pounds tensile strength. That is the extreme notch on cast iron, I believe, that can be found in any text books."

Mr. Flagg: "When you get a strong 1-inch square bar, you get into close, hard iron, and in the ½-inch something brittle."

Mr. Outerbridge: "Our experience is not in favor of the ½ inch bar. It may be adapted for thin plate, but not for large castings."

Mr. Henderson then read a communication from Mr. John E. Fry, of Pittsburg, taking exception to many of the statements made in Mr. Keep's paper, read at the April meeting of the Association. He pointed out that Mr. Keep did not explain how an equation is to be written to refer the physical results of his findings to castings of varying sections; criticized his method of applying lateral stress, instead of the customary extension pull to determine cohesive strength. He pointed out that the iron used by Mr. Keep in pouring his test bar in test No. 782, having 3 per cent. carbon, 3.5 per cent. silicon, 1 per cent. phosphorus, .50 per cent. manganese and .08 per cent. sulphur was totally unfit for use in any machinery casting requiring strength, while Mr. Keep's figures themselves showed it unfit for half-inch bars that required strength. "We need not go beyond this single hand ladleful of iron," says Mr. Fry, "to cause us to be 'shy' of this erratic little test bar."

Farther on Mr. Fry says: "In ordinary machinery work the difference in the dryness of two green-sand molds would signify nothing in effect on the iron, but in the case of these little bars it is different. The mold for the Keep bar presents 8 square inches of sand-surface to each cubic inch of iron; or by weight there are 30 sq. in. of sand-surface to one pound of the iron. It is plain, then, that the relative heat-conducting power of these molds becomes an important factor, as a very trifle of dryness of one would strongly affect the time of solidification, and the more quickly cooled bar would be closer grained from its more completely diffused carbon. Only castings of ¼″ in thickness and under are subject to the mold conditions of these little test bars.

"What application of this test bar can be made in irons for heavier work than quarter-inch thick and under? How does it 'relate' to such. Is not this little bar a 'true fourth place of decimals' relative to an ordinary machinery casting? Would you trust it? Let us consider your practice in this respect: You send patterns of castings requiring strength to the one foundry in your city which has reverberatory or 'air' furnaces. The physicist at this shop casts a test bar having more than 40 times the section of Mr. Keep's. Chemistry determines the general character of the metal charge of the furnace and the physicist 'tempers' the melted charge to compensate for chemical changes occurring during the several hours of treatment in the furnace. You all know you get a stronger casting there than by guess-work in your own metal yards, and up to date most of you do not care for the 'why.' Will the owner of this foundry tell you he cannot closely approximate a physical result from the chemical analyses of his irons? Will not he contract to deliver castings having definite and very high tensile strength? Surely; but it would be as definite to judge the strength of a 36-inch mill roll from the iron which ran into a vent hole as to guess at the relation between Mr. Keep's little bar and any of the castings made for you."

In conclusion, Mr. Fry expressed the opinion that Mr. Keep's views regarding the effects of the several metalloids in cast iron are questionable "as long as he leans so heavily on this little bar which brings in so many conditions that do not obtain in machinery castings. Chemical analysis fits all classes of castings, while test bars, to be trustworthy, must be of a size to give approximately constant results when cast under ordinary conditions. This Mr. Keep's bar will not do and his machine will not take bars which will."

The reports of the different sections of the association were then given. Mr. Wanner said that on cast iron pipe prices were still low, but a trifle steadier. On sash-weights, Mr. E. E. Brown reported that foundries were all on short time and he could only hope that prices would not go lower than those of the past six weeks. Mr. Flagg, on malleable iron and small castings, reported matters about as they were. "I was out West recently," said he, "and found everything very dull there." He urged that the association be sub-divided into sections, according to castings made, so that the representative of each section could call on others in that branch for information. He gave notice that at the next meeting he would move for such action. Adjourned.

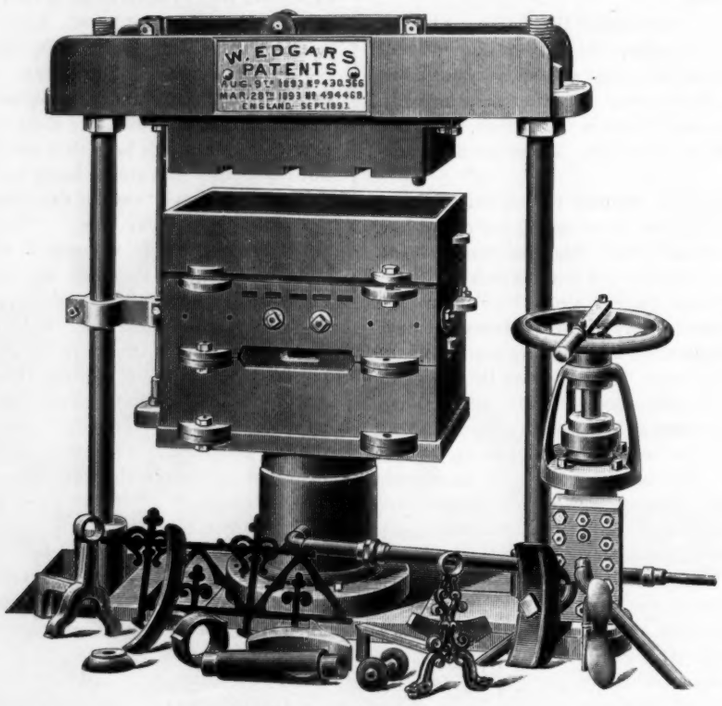
HYDRAULIC MOLDING MACHINE.

The cut represents W. Edgar's hydraulic molding machine, which is protected by three patents (with application for a fourth) in the United States, and by one in England. It is the result of 20 years study and experiment by the inventor, a practical molder and machinist, and is the fifth machine made, as each of the others had some objectionable feature. To be a commercial success a molding machine must be stroug and simple; must produce first class work without the help of skilled labor and in such quantities as will justify the original outlay. Further, it must be practically impossible for it to get out of order. In his "Molder's Text Book," Mr. Thos. D. West says: "I do not know of a molding machine in the market that does not require the same amount of skill to operate, as it does to do the work by hand," and up to that time he was doubtless correct.

Mr. Edgar writes as follows of his efforts in the production of molding machines and of the possibilities of the one shown in the illustration: "My first attempt to make a molding machine was with a two-fold object—first to increase the quantity, and second, to reduce the heavy labor attending molding. These I have kept steadily in view and now I claim to have accomplished them. To do these things the machine must have neither gears, worms, pulleys, levers nor belts of any description, or it will break down and require a skilled mechanic to repair it. I have tried all the above methods and found them useless. Experience has taught me that they cannot be protected from sand and dust, and sooner or later there will be a break down. To avoid this, every motion of my machine is made by hydraulic power, and if it were possible for sand or dust to get to any working part the pressure of water would keep it out. I have had a machine working steadily over a year and it has not cost one cent for repairs, except in leather packing."

With regard to hydraulic power I believe it is the best for foundry work whether for cranes, hoists or machines. It can be produced at a very moderate cost as nearly every foundry and machine shop has tools with which to make an accumulator. The pressure I use is 750 pounds to the square inch. The molding machine has three motions: first, to raise patterns; second, to bring forward the head plate, and third, to press sand in mold. All these are made by the operator turning the valve wheel three quarter. The reversing of the wheel lowers the mold, sets back the head plate and draws the pattern, leaving the mold ready to be removed, with all the gates cut, ready for the metal. This operation takes just 15 seconds. It is no use saying how many molds could be made in a day; it is simply a question of removing them fast enough. There is no limit to the size of mold it will make and I believe it is the only power machine which will make a mold from 36x18, down to one 6 in. square on a single size of machine. At the foot of the cut are samples of several castings made on this machine and there is practically no limit to what it will produce perfectly."

The inventor is W. Edgar, of the Edgar & Nelson Foundry Co., Mobile, Ala.



HYDRAULIC MOLDING MACHINE.

In a circular which has been issued by the board of management of the British Iron Trade Association, it is announced that the board has determined that the time has come when some attempt should be made to ascertain with some degree of precision the principal causes of the successful competition of German and Belgian manufacturers of iron and steel in the markets of Great Britain and her colonies. The board especially invites observations on the causes of the growing success of German manufacturers in British and other markets, under the heads of (1) the comparative cost of raw materials; (2) wages; (3) railway rates; (4) special conditions, etc., and (5) remedies.

The Brownell & Co., of Dayton, O., manufacturers of engines and boilers, have bought the exclusive right to manufacture engines under the patents of C. M. Giddings, late of the Sioux City (Ia.) Engine Works, and he will have charge of their department of engineering. The Brownell & Co. will make a specialty of high grade automatic engines, both simple and compound, and have purchased the entire stock of drawings, patterns, finished and unfinished automatic engines of the Sioux City Engine Works. These engines are known in the trade as the Russell single valve automatic. This departure, together with additions to the equipment of their boiler department made by the Brownell & Co. put them in better position than ever to give excellent service on power equipment contracts.

THE ERRATIC SQUARE TEST BAR.*

BY THOS. D. WEST.

Mr. Keep's paper read before this Association April 4th, and one read at the meeting of the Western Foundrymen's Association March 28, 1894, chiefly emanated from an article the writer prepared for *The Iron Trade Review* in answer to an inquiry by a correspondent of that paper, as to the cause of variations in the strength of test bars taken from the beginning and end of heats. It was claimed that those taken from the latter end were always the strongest. My answer was that the strength of bars at the different ends of the heat, in my judgment depended altogether on the character of the metal used; and second, it would seem to me that the correspondent's cupola worked colder at the latter part of the heat, and hence did not liberate so much sulphur, or the iron absorbed more of it, and in doing so promoted the formation of combined carbon, which, with decreased silicon, is the cause of increased strength.

Now, Mr. Keep says at the commencement of his Western Association address, referring to the above: "We shall prove that the difference is caused by the variation in heat at which the iron is melted, not the heat of the iron when it was put into the mould;" and then further down, turns "about face" to prove by four test bars poured "all from one ladle of 28 lbs. cupola iron" that it is not the heat at which the iron is melted, but the heat at which the metal is poured that gives the strongest iron, and says: "Iron grows stronger as it stands in the ladle." I have studied hard to reconcile the two statements, but have failed.

The pouring of hot and dull test bars to obtain comparisons, the writer tried over fourteen years ago, and in New York City, in November, 1884, I read a paper treating this subject, before the American Society of Mechanical Engineers. My first trial tested in a crude manner showed a dull poured bar to be the strongest, but in subsequent experiments with 4 inches, two inches and one inch square bars planed on the four sides accurately to size, at the old "Cuyahoga Works," Cleveland, in 1884, I found in breaking the hot and cold poured bars, that the hot poured ones stood the greatest load. Also, about this time, Mr. Gardner, foreman of Pratt & Whitney's foundry, Hartford, Conn., experimented in this line and wrote me that he found the hottest poured bars to give the greatest strength. I would also state that at the time I experimented with the planed bars, I also tried one-inch square bars in the rough and found with them the same results as with the above four-inch, two-inch and one inch test bars. Any one that may be interested in these experiments can find them fully detailed by referring to "American Foundry Practice," Page 253, and "Moulders' Text Book," Page 8.

Now in view of these facts and experiments, I think I am entitled to say that Mr. Keep has not proved anything with his "mechanical analysis," or "sensitive test bars," as he calls them, a term I am at a loss to define, and I do think he would throw considerable light on the subject if he would point out definitely what he means by "sensitive test bars." I would like to ask what they are sensitive to. And now that he has called our attention to his system as a means for comparison in testing the physical qualities of cast iron, I can no longer remain silent. My experience and study in testing the physical qualities of cast iron will not permit me to indorse "Keep's test for cast iron" as a standard most favorable to intelligent comparison in studying physical phenomena of cast iron in the various branches of practical every day founding.

For about eight years I have held the position that a round test bar, cast on end, is best adapted to making a comparison of the transverse strength or physical qualities of cast iron. I believe we could continue making tests with square bars "cast flat" (the smaller below one inch square the more unreliable) until the ores of all the earth were used up, and not be able to arrive at intelligent comparisons of physical phenomena of cast iron.

I see so much now depending on chemical and physical tests to give the founder positive knowledge as to the working of cast iron that I cannot but express the conviction that all the experience, intelligence and efforts of the Eastern and Western Associations should be directed to the adoption of some standard system, which, in their judgment, would prove best for testing the physical qualities of cast iron. And this should be done before any further statistics are tabulated on the physical phenomena of cast iron. How are we to make comparisons, or even say what is the transverse strength of cast iron, when we find test bars being used varying all the way from 4 feet down to 1 foot in length, and from 2 inches down to ½-inch square in area; even granting a square bar to be the best form? If Mr. Keep will define "sensitive test bars," there are other points also, which it would be well to have understood. I would ask him to explain the utility of his impact tests to the founder, and in what relation he has found them conforming to the transverse tests of like metal? And I would also ask why he draws the line at transverse and impact tests, and ignores tensile elements in cast iron? If we require impact, why should we ignore tensile strength, as Mr. Keep does? And when we practically consider the question, are there not sufficient relations between transverse strength and deflection combined with contraction and chill to permit our judging of impact and tensile qualities as closely as we could when they are all compiled in one table, and then try to figure out their relative qualities? I mainly throw out this suggestion from the faith that the more simple and less complex we can make a system of tests for cast iron, the less confusion will result, and the more speedy and accurate will be the attainment of the true natural qualities necessary to intelligent founding.

I have studied the statistics of "dead load," impacts, "shrinkage" and chill, on which Mr. Keep has expended much labor and research in compiling for our consideration, in his Chicago paper of March 28th. In subtracting the impact from the "dead load" column, one is struck with confusion in endeavoring to make deductions that could be practically applied to general every day founding.

Mr. Keep, in his paper before this Association, April 4th, says: "The cold cupola at the beginning of a heat gives higher shrinkage every time." Then in another paragraph he says: "The increase in sulphur and the change in physical character was due to a cold furnace or cupola." Now, I claim Mr. Keep's reasoning on this point is wrong, and would say that his "higher shrinkage and increase in sulphur" at the commencement of the heat is not due to a cold cupola, but is due to the harder grades or qualities of iron melting first, and if Mr. Keep will look to his own series, No. IV, he will find that the combined carbon, sulphur and manganese stand highest in the first drawn metal. And to show authority for hard or strong grades having a lower fusing point than soft grades, I would refer to the following: "No. 1 iron has a higher melting point than No. 2"—Spretson, page 24. "The degree of fusibility depends on the amount of carbon which it contains" *Strength of Material*, page 31—John Anderson. "Fusing point of grey cast iron, 2.192 degreees; white cast iron, 1.922 degrees, Fahr."—Pouillet in *American Cyclopedia*, Vol. VII, page 546. "Silicon melts at a point above pig iron; grey pig difficult of fusion; white iron readily fusible"—*Barker's College Chemistry*, page 265. And Mr. Bloxham in comparing grey and white iron, says: "The larger proportion of metallic iron contained in the grey cast iron causes it to require a higher degree of heat before it begins to exhibit signs of fusion, but it is capable of becoming very liquid at a sufficient high temperature so as to be easily run into moulds." "White cast iron, on the other hand, is softened at a rather lower temperature, but does not flow well."

To carry this point further, I would say that it is generally conceded by experienced, heavy-machine jobbing founders that hard or strong cast iron melts easiest, and if there are four or five grades of iron to be taken out of a cupola at one heat, the hard or strong iron—if desired to make a good, sound, clean casting—will generally be charged first in order to prevent it from melting and dropping down to contaminate soft iron, as would occur if the latter were the first charged. After a cupola gets well under way the softer qualities then come down to unite more uniformly with the harder elements of the iron; and thus, after the first one to twenty hundreds is melted, which is largely dependent on the size of a cupola, we obtain a more uniform result from the mixture charged. And to still stronger sustain my claim of the harder elements in iron melting first, I would ask the question: Does not an increase in contraction and chill imply an increase in the hardness of

*Read at the Eastern Foundrymen's Association, Philadelphia, May 2d, 1894.

iron? I think experienced founders will agree with me in saying yes. Now, I refer all to Mr. Keep's own tables, representing 11 heats, of tests taken at different stages of the heats, as shown in his Western paper. Here we find every heat gives the highest contraction and nearly all the deepest chill, at the first metal, which, as he claims, was poured after about 400 lbs. had been taken from the cupola. Mr. Keep compiled this table I, am led to believe, solely for the purpose of trying to obtain some data to show, if possible, reason for obtaining stronger iron at the latter end of heats, and he says: "There is no uniform variation in strength, but there is in each case a decrease in shrinkage and chill." I have deducted reasonable logic from his contraction and chill tests, but have not attempted to do so from his records of transverse tests, as I claim a square test bar cast flat is such an erratic, crazy-headed thing one cannot place any reliance in what it will do, or where it will go. It is more liable to show weak iron to be strong, or the reverse, as "hit" near the natural qualities of iron.

I respectfully here call attention to the ill use by Mr. Keep of the term "shrinkage." The experience of the heavy work founder teaches him there are two elements in iron cooling from a liquid state to that of a solidified body having a temperature of summer heat. In heavy work, as all experienced men know, "riser" or "feeding heads" are necessary to make a solid casting. The metal in cooling down from a liquid to a solid state often requires feeding with additional fluid iron to prevent the casting being hollow or full of cavities. This is "shrinkage." After the metal has become solidified, it then commences to draw together or occupy less space. This is "contraction" and not "shrinkage," as Mr. Keep calls it. As we are organized for the purpose of lifting the art of founding to a higher plane and be governed more by science than guesses, I think it behooves us all to contend for proper definitions in terms as well as results in practice.

Mr. Keep's reasoning regarding the heat of a cupola is to the end that we should expect better and hotter iron after the fore part of a heat. This is news to me. My experience and observation in this line has been just the reverse. I never knew of an experienced heavy work founder, desirous of obtaining the hottest and cleanest iron for some special casting, who did not figure on taking it from the first charges of a heat, and would say that Mr. Keep's reasoning on this point is alone sufficient to lead one to error in trying to solve the problem under discussion of variation in strength of test bars at beginning and end of heats. I admit a cupola gets hotter if we limit our observations to the charging door or the heat going up the stack; but we should look to the "melting point" for effective results, not to the charging door or stack. We cannot see the heat at the "melting point." We can only judge of results by a process of reasoning. We know that at the fore part of a heat the fuel is comparatively fresh, clean and free of slag in the bed. The blast has then the freest chance to distribute its oxygen to the carbon of the fuel, as there is little slag or chilled iron at the tuyeres to prevent its proper delivery, and hence achieves the best results at the "melting point." I claim if a cupola is working proper, we can obtain the hottest and cleanest iron at the fore part of a heat, and I believe the influences are to generally give the higher sulphur to iron at the middle and latter part of heats where a good system of fluxing and "slagging out" is not practiced, and that the effect of an increase in sulphur is to decrease silicon and promote combined carbon. Whether this would increase or diminish the strength of iron, I would say, depends on the mixture of the metal used. If the mixture is for soft work or iron high in silicon, the sulphur could be the cause of decreasing silicon and increasing combined carbon to such an extent as to promote strength. And then again, if the mixture charged was for strong or low silicon iron, the tendency of the sulphur could be to decrease the strength or a result just the reverse of the soft mixture.

Do not confound the higher sulphur in the first drawn metal with that absorbed by iron in being remelted later on, as advanced in other parts of this paper. I do not wish to be understood as recommending sulphur as a desirable element for strength. It has a limit to be guarded very carefully in seeking strength in sand castings, and is ruinous for chilled work, as ably outlined by President James Roberts, in his annual address before the South Staffordshire Institute of Iron and Steel Works Managers, Jan. 20th, 1894.

Mr. Keep in his paper, cites the sensitiveness and potency of his small test bars with a faith that should carry assurance, but nevertheless neither his test bar results nor his reasoning have convinced me of the correctness of his conclusions. My reasons for the correspondent of *The Iron Trade Review* obtaining the stronger bars from the latter part of his heats, I claim have not been refuted by Mr. Keep, and in fact his own logic to disprove mine goes to sustain the reasoning I apply. In the sixth paragraph from the end of his Western paper he says: "Instead of laying the blame on the sulphur in the fuel it should be ascribed to lack of carbon in the fuel which produces a cold cupola, which is likely to make just such iron as 788," seen in his series IV. I would ask all to pause a moment and weigh this question and see if he is not sustaining the very point I make, which is, that the cupola worked colder at the latter end of the heat, and not the fore part as he claims. It strikes me if there is any decrease of carbon in the fuel we should expect it at the latter end of a heat, as a cupola has then about run its course. I said nothing about sulphur in the fuel. What I claim is, that the hotter you can melt iron with good slagging out, the more sulphur is liberated from it, or the duller the iron "comes down," the more sulphur it will absorb and retain.

The test 788, seen in series IV, which Mr. Keep refers us to, only more strongly confirms the statements I have made as to harder elements in iron melting easier than softer qualities. It is true that the transverse strength of the test bar 788 does not accord with the principle of receiving stronger test bars from the end of a heat, but as I claim elsewhere, that a square test bar is too erratic to be reliable in giving the true natural strength of iron, my reasons for ignoring the "dead-load" factor cannot but be apparent. I desire to especially emphasize the fact the position of this paper is in no wise based on data derived from the transverse strength of cast iron. With regard to the claim that the latter end of heats did give the stronger test bars, I am simply taking the position that this could be true where one has charged a uniform mixture throughout a heat, with a view of obtaining a soft or medium grade of iron.

Mr. Keep says I jump at conclusions. I can only return the compliment, and to decide who jumps the farthest, am willing to accept the Association as referee. But in good faith I will say to Mr. Keep that we will all be kept jumping until we have some more satisfactory system of arriving at conclusions regarding cast iron than at present.

I think Mr. Keep makes one pretty big jump in asserting in his Philadelphia paper: "It is always customary to allow metal to become as cold as possible before pouring, so as to get the greatest strength." I must say this is another piece of news to me. If this is always customary, I have never been around when it was practiced to obtain such results. I do know that when I have seen metal allowed to "cool off," it was done tn prevent "run outs." "scabs," "blow ups" and rough skinned castings, and aid secure solid castings in massive work, but it is the first time I have been informed that it is always customary where strong castings are to be obtained (don't confound the term strong with solid; they mean two different elements in castings).

After considerable discussion, Mr. Keep recedes from his first position on chemistry being useless to founding, and in his paper of March 28th, says; "He could do nothing without it;" and then in his last paper returns again to his old love and informs us that the contraction and fracture is sufficient for a guide, and he tells us how to mix a little of the new with lots of the old to obtain a knowledge of what the new will do. If we would commence such a practice in our works, an assignee would in a very short space of time be running our business. If Mr. Keep ever had any experience in the higher branches of founding, he would never have come out with his mix a little of the new with lots of the old doctrine. A jobbing heavy work founder has almost daily to handle and melt from two to six different grades of iron in one heat, and the idea of mixing a little of the new with lots of the old to find out how the new would do, in a machine or jobbing foundry, is a plan that I think can be far surpassed by any founder. Mr. Keep's schemes, of anything to knock out the chemist, will only befog or injure instead of aiding to enlighten or benefit the art of founding.

I will not say that an experienced founder could not often

"hit" it in mixing iron without resorting to chemistry, but I will say that those that are in any position to utilize chemistry will find it a much more reliable agent than judging wholly by fracture or Keep's shrinkage and "mechanical analysis" system.

I would like very much if the length of this paper did not prevent, describing some of the beautiful illustrations I have witnessed in my time of bad castings resulting from judging iron wholly by fracture; and some other time I may do so, as the incidents could not but greatly assist in proving the value of chemistry to the founder.

Before leaving the question of chemistry I would like to correct the allusion Mr. Keep made to our controlling a laboratory. I only wish we had business to half engage a chemist's time. I would soon find enough work to keep the other half employed. We know the chemical elements of every ton of iron we receive, and to know what is in the resulting castings, Mr. McShiras, a chemist connected with a blast furnace close to our plant, makes a determination of every heat for us, and now that we know the value of such determinations we would no more think of abolishing chemistry than we would think of trying to get good castings without "skimming" our ladles when the moulds are poured.

There are several more points in Mr. Keep's last two papers which I would like very much to dwell upon, but as I have taken too much space now and I have a very important question which I am desirous of bringing to an issue, I will forego them for the present.

Mr. Keep in his paper of April 4th, 1894, under the paragraph "Keep's Foundry Chemistry," says: "For 20 years I was a close student of metallurgical chemistry in charge of foundry work and failed to find a relation between the chemical composition and the strength of test bars of various shapes." Then in the next paragraph he says: "When I hit on a half-inch test bar for shrinkage, I found a solution of the whole problem." I must confess it rather puzzles one a little in trying to connect the terms, "strength," "various shapes" and "shrinkage" as he has arranged them, but judging from the tenor of all his writings, I think I will not be far off in taking it for granted that Mr. Keep stands ready to affirm that his one-half inch square test bar, cast flat, as advocated by him is the best and most correct form to adopt in attaining the contraction and strength of cast iron. Now, with twenty years' experience and study on various shapes of test bars before making the "hit" on his ½ inch square bar cast flat, he must be able scientifically to sustain his position, and this I would call upon him to do. As a member of the foundrymen's organization I think I have a right to ask this, since Mr. Keep has presented his system before us as a means of making comparisons of physical qualities of cast iron.

I claim that if a committee of the most experienced and best informed founders, metallurgists and engineers had met to study up the most unmechanical, unreliable and unscientific system for obtaining the natural transverse qualities of cast iron, they could not have "hit" on any other system than the square test bar cast flat. I am aware that for all time this has been the basis of the elaborate tables of transverse strength for use by our engineers and publication in all our scientific text books; yet in view of all this, I say the practice is wrong, and now that we have two intelligent bodies of practical iron founders allied with experienced metallurgists and chemists, I shall labor to prove that the position I have taken is the correct one. Further, I would say to Mr. Keep that my only motive in bringing up the subject is to aid in obtaining true scientific reasons for the phenomena encountered in the manipulation of cast iron.

I am now preparing a paper to be read at the coming meeting of the Western association, May 16, in which I shall offer reasons why a round test bar cast on end should be adopted as a standard. In another paper I shall outline a system for moulding and casting transverse bars, accompanied with a method for obtaining the contraction and chill, which I also claim are not being best attained at the present day. The three elements will make lengthy papers, hence my reasons for not bringing the subject forward at this time. As I shall endeavor to treat the subject scientifically, I hope Mr. Keep will meet me likewise, with any points he may present to refute my arguments.

From a study of this paper the reader will perceive it involves a discussion of the following twelve points, on all of which I have largely committed myself for the affirmative or negative.

First: Can an increase in sulphur be a cause to promote strength in any certain grades of cast iron? If so, state conditions and the class of iron or work it could be beneficial or injurious to.

Second: When may we expect iron to absorb or retain the higher sulphur? At the fore part, middle or latter parts of a heat? Or is it a sort of go-as-you-please element and entirely regulated by the heat of a cupola? If so, which has the greater influence in increasing sulphur in the iron, a hot or cold working cupola? Or in other words, the duller iron is melted, will it not absorb and retain the higher sulphur? And also, is not good fluxing and slagging out very beneficial in lowering or carrying off sulphur from iron as it melts?

Third: What experience if any have members in the use of hot and dull poured test bars to establish a precedent in favor of either temperatures giving the strongest test bars? State quality of iron used.

Fourth: If a hard and soft grade of iron are mixed together in the "bed," or in the first charge of a cupola, which would "come down" first and why.

Fifth: When should a cupola be expected to give the hottest and cleanest liquid metal, at the fore part, middle or latter end of a heat, provided a cupola is working properly.

Sixth: What experience if any have members had with hot or dulled poured metal giving the strongest castings?

Seventh: Is it ever possible to be deceived in wholly judging of iron by its fracture or grain?

Eighth: Can a good No. 1 Bessemer piece of pig be selected by its fracture from several pieces of good No. 1 foundry, without a chemical analysis? If so, state physical points to judge by.

Ninth: What need has the founder of impact and tensile tests? Cannot transverse, deflection, contraction and chill, impart all the information in exhibiting the different characteristic qualities of cast iron necessary in mixing metal for ordinary foundry work and general building and engineering purposes? If there are specialties for which such would not be sufficient, state them and why.

Tenth: Are impact blows on the end of a test ber of any value to determine what iron will resist from blows or shocks in castings? Are not the proportion and form of a casting the chief elements to decide the strength of iron to withstand blows, and in reality, if we use an impact test at all, should it not be by blows on the castings themselves or small models of them?

Eleventh: Will not an increase in contraction and chill imply an increase in the hardness of iron?

Twelfth: If there is no cause suggested in this paper for obtaining the strongest test bars from the latter end of heats where the same mixtures are used throughout a heat, what then is the cause?

I will not present any question relating to the subject of round or square test bars at the present time, as I prefer to leave the discussion upon this question open for the Western Meeting on the 16 inst. and to give Mr. Keep an opportunity to advance any facts or argument he may desire, upon the questions raised by this paper. When he has done so, I would be pleased to present a paper to meet his.

It is not expected one meeting can dispose of all the subjects which this paper suggests. The question of "higher shrinkage" and "sulphur" at the commencement of a heat is a very interesting one, and the stand Mr. Keep has taken on this point is such as I believe to be maintained by late writers in explaining chilled and close-grained iron being attained from the first drawn metal of a newly "blown in" blast furnace, nevertheless I cannot bring myself to consider the conditions in a cupola to be the same. And this is one reason for presenting this paper to the Association, as the wide range of experience, combined with the intelligence it embodies, should enable it to solve most any problem that late research could throw light upon.

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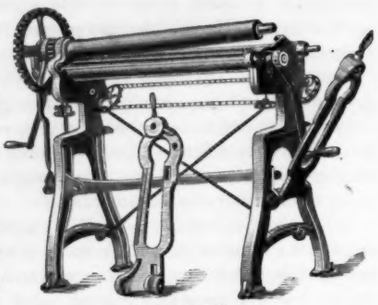

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INDUSTRIAL SUMMARY.

New Enterprises:—

The following recent incorporations, specially reported for *The Iron Trade Review*, are of interest to the iron and machinery trades:

Chicago, Ill.—Taylor-Belding Electric Co.; capital, $10,000; to deal in and manufacture machinery, electrical supplies, etc.; incorporators: Chas. H. Taylor, Warren S. Belding and David Fales. Address letters care of David Fales, Portland Blk., Chicago, Ill.

Buffalo, N. Y.—Queen City Radiator Co.; capital, $300,000; to manufacture radiators; incorporators: W. F. Bryant, Orin Bryant, both of 921 Prospect ave.; W. H. Harell, 769 West ave., Buffalo, N. Y. Address letters care of W. P. Smith, 110 Franklin st., Buffalo, N. Y.

Chicago, Ill.—Cutler-Hammer Mfg. Co.; capital, $4,000; to manufacture and deal in electrical appliances and supplies; incorporators: H. H. Cutler, E. W. Hammer and R. L. Commons. Address letters care of Francis W. Parker, 100 Opera House Bldg., Chicago, Ill.

Milwaukee, Wis.—Wisconsin Iron & Wire Works; capital, $30,000; for manufacturing and selling agricultural iron, wire and metal goods, etc.; incorporators: G. H. Norris, J. H. Berkley and J. H. Gillman. Address letters care of Van Dyke & Van Dyke, Milwaukee, Wis.

Scranton, Pa.—Scranton Mfg. Co.; capital, $20,000; for the manufacture of iron or steel or both, etc., from metal, wood, etc.; incorporators: A. G. Brandt, Wm. D. Boyer, Scranton, Pa.; Wm. W. Wharton, Smyrna, Del. Address letters care of Homer Shoemaker, Harrisburg, Pa.

Cleveland, O.—The Cleveland Car Supply Co.; capital, $10,000; for manufacturing railroad apparatus and appliances; incorporators: Samuel F. Voth, J. W. Holcomb, Ernst C. Schwan, Geo. H. Schwan and Wm. B. Bolton. Address letters care of Wm. B. Bolton, Cleveland, O.

Lewiston, N. Y.—The Casey Nailing Machine Co.; capital, $10,000; for manufacturing nailing machines; incorporators: Jeremiah Casey, Lewiston, N. Y.; Helen E. Casey, Edgewater, N. J.; Geo. Dougherty, Macdonough st., Brooklyn, N. Y. Address letters care of J. Casey, Lewiston, N. Y.

New York City, N. Y.—Imperial Electric Lamp Co.; capital, $250,000; for manufacturing electric lamps and appliances; incorporators: H. F. Rogers, Jno. F. Wood, Huntington, N. Y.; R. I. Murray, Chappaqua, N. Y. Address letters care of Sammis & Bierck, 6 Wall st., New York City, N. Y.

New York City, N. Y.—New York Warming & Ventilating Co.; capital, $50,000; for manufacturing warming and ventilating apparatus; incorporators: W. F. Wolf, Boston, Mass.; H. M. Caswell, Troy, N. Y.; Wm. H. Knowlson, Peekskill, N. Y. Address letters care of W. F. Wolf, Boston, Mass.

Cleveland, O.—The Lynn Mfg. Co.; capital, $10,000; for manufacturing and selling steam flue cleaners, hose clamps, novelties, etc.; incorporators: L. J. Hammond, R. H. Carlisle, F. E. Strong, C. H. Pennington, W. N. Strong and Edward A. Walton. Address letters care of Geo. H. Burrows, Cleveland, O.

New York City, N. Y.—Geo. L. Colgate Co.; capital, $20,000; for manufacturing electrical machinery; incorporators: Geo. L. Colgate, Fanwood, N. J.; Geo. O. Van Voast, Jr., 543 Herkimer st.; I. A. Stevenson, 394 Shepard ave., Brooklyn, N. Y. Address letters care of P. L. Klock, 203 Broadway, New York City, N. Y.

Saltsburg, Pa.—The Saltsburg Rolling Mill Co.; capital, $100,000; for the manufacture of iron or steel or both, or of any other metal or of any articles of commerce from metal, wood, or both; incorporators: S. A. Gourley, Gilbraith Stitt, Apollo, Pa., and W. F. Stitt, Saltsburg, Pa. Address letters care of M. F. Leason, Kittanning, Pa.

Chicago, Ill.—Harmon Mfg. Co.; capital, $10,000; for manufacturing all kinds of machinery, patent inventions, novelties, etc., and to buy, sell and deal in raw or manufactured goods, and do a general commercial business; incorporators: Wm. Jno. Farwell, Henry Brandenberg and Alonzo Baldwin. Address letters care of Henry Brandenberg, 503-4 Tacoma Bldg., Chicago, Ill.

Chicago, Ill.—Mason Electric Co.; capital $10,000; to manufacture, buy and sell machinery and merchandise used for equipping or constructing electric railroads, mining plants or kindred interests and the construction of electric roads; incorporators: Norman Totten, Frank A. Moore and Manton Maverick. Address letters care of T. A. Moore, 4458 Berkeley ave., Chicago, Ill.

Chicago, Ill.—East Chicago Water Works Co.; capital, $100,000; to erect, build, own and operate a water works plant at East Chicago, Ind., also to secure right to lay mains and generally to do all things necessary in connection therewith; incorporators: Newton P. R. Hatch, Jno O. Staples and Edw. R. Conant. Address letters care of N. P. R. Hatch, 8013 Rookery Bldg., Chicago, Ill.

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SHEET METAL MACHINERY.

Address **J. H. B.,** 1141 Monadnock, Chicago.

The Kansas City Steel & Iron Co., Kansas City, Mo., have recently been organized with a capital of $350,000. It is expected the plant will be in operation soon. They will manufacture steel by the Cline process, which is adapted to machine tools, car couplers, etc. They will also make mining machinery.

The Supervising Architect, Washington, D. C., will receive sealed proposals until 2 P. M., May 29, 1894, for all the labor and materials required to put in place complete the steel and cast iron columns, in 2nd, 3rd, 4th and 5th stories, steel and iron floor construction of 3rd, 4th, 5th and 6th floors, etc., for the U. S. Postoffice building at Washington, D. C.

The Montpelier Sheet & Tin Plate Co., of Montpelier, Blackford Co., Ind., has been recently incorporated to manufacture black plates, terne plates and bright plates. It is expected that the plant to be erected will put about an acre under cover. The purchases of the company will include 1,000 h. p. boilers, 1,000 h. p. engines, conveying machinery, cranes, feed water heater, fire brick and clay, machine shop supplies, portable forges, pulleys, hangers, shafting, pumps and rolling mill machinery.

New Construction:—

North Bros. & Co., Philadelphia, will erect a three-story foundry.

Chantrell Tool Co., Reading, Pa., are contemplating the erection of a three-story building, 60x150 feet.

The Shenandoah Steel Roofing Co., of Woodstock, Va., contemplate establishing a plant at Staunton, Va.

The People's Iron Works, Philadelphia, have just let the contract for the erection of a new machine shop 30x160 feet.

At Philadelphia, work has just begun on the new building of the Fidelity Mutual Life Association, the Pencoyd Iron Works getting the contract for the iron construction, which is a large tonnage.

A dispatch from Hamilton, Ont., says that a contract has been signed by the Philadelphia Engineering Co., of Philadelphia, to erect a blast furnace plant there for a local company for $360,000, the works to be in running order by the 1st of January next.

Additions, Enlargements, Removals, Etc.:—

The Crescent Brass & Iron Works Co., of Detroit, are building an extension, 46x100 feet, to be used as a foundry. When the building is completed more men will be employed.

The Frankford Steel Works, Philadelphia, are negotiating for the removal of their entire plant to the West. The city of Philadelphia proposes to run a street through the present works.

The Indiana Wire Fence Co., of Crawfordsville, Ind., will erect a two-story brick building, 56x63 feet, in which they will put a number of new machines. They will also build a larger warehouse, 140x127 feet.

The Connersville Blower Co., of Connersville, Ind., are increasing their capacity by an addition to their buildings and equipment and are in position to achieve even greater success than has attended their operations from the first.

The Williamsport (Pa.) Valve & Hydrant Co. will build an addition 45x100 feet, to be used as a stock room. The company's foundry is 45x60 feet, and machine and finishing shop 45x128 feet, and are of ample size and well arranged.

Fires and Accidents:—

The Jelly Foundry Co.'s plant at Millvale, Pa., was destroyed by fire April 29. The loss is estimated at $30,000, with but $4,500 insurance.

The machine shop of W. H. Terwilliger & Co., at Amsterdam, N, Y., was destroyed by fire April 24. Loss nearly total, covered by $7,000 insurance.

At Marietta, Ga., the Marietta & North Georgia Railroad shops were burned May 1, with five locomotives and several new cars. The loss is $150,000; insurance, $127,000.

At Central City, near Huntington, W. Va., in a hurricane on May 5, the Ohio River railroad shops and round house were completely demolished, with a loss of about $30,000. J. H. Burkhart, the superintendent, was buried beneath the debris, but was extricated and will recover.

The Wm. N. Whitely mower and reaper works at Muncie, Ind., burned down May 6. The buildings were of wood and iron, and the loss is not so heavy on them as from the burning of 2,000 machines ready for shipment, and 1,500 almost completed, besides patterns and machinery. The loss is upward of $200,000. About 300 men have had employment in the works.

General Industrial Notes:—

It is stated that efforts are being made to establish a car works at Augusta, Ga.

The Pennsylvania Steel Co., succeeded in rediscounting most of its notes which matured on April 16. The extension is for four months. Much of this paper is held in New York.

The reorganization plan is favorably received by the creditors, but the stockholders as a body are opposed to it.

The Belmont furnace of the Wheeling (W. Va.) Iron & Steel Co. was banked April 29, owing to the shortage of coke.

The blast furnace of the Norton Iron Works, at Ashland, Ky., has been compelled to shut down from a failure of coke supply.

The scarcity of coke compelling a stop, the Monongahela Furnace Co.'s Furnace A, at McKeesport, Pa., will be repaired. Furnace B is banked.

The Hess Spring & Axle Co., of Carthage, O., recently incorporated, bought the plant at that place, of the Union Axle Co., and will manufacture axles and springs.

Suits to foreclose mortgages amounting to $132,000 against the Maumee Rolling Mill Co., and John E. Mosher, of Toledo, have been brought by James Secor and Thos. H. Walbridge, trustees.

The new factory of the Garland Chain Co., at Rankin, is almost completed and will soon be ready to be put in operation. Contracts have been closed for a number of machines for the manufacture of light and heavy chains.

Furnace No. 1, of the Crane Iron Co., at Catasaqua, Pa., is still producing over 100 tons of good foundry iron daily. It has been in blast two years and ten months, during which time it has made over 700,000 tons of iron.

The Berlin Iron Bridge Co. paid, on April 14th, their regular quarterly dividend of 1½ per cent. Considering the hard times in all branches of business, especially among manufacturers of structural iron, this certainly shows good management.

The Acme Machinery Co., of Cleveland, report the receipt of some foreign orders, which they trace to their World's Fair exhibit. From Valparaiso, Chili, they have an order for a large heading machine and they are now filling a contract for two bolt cutting machines for the Hungarian State Railroad at Buda Pesth.

A dispatch from Chester, Pa., says: "Receiver William B. Broomall, of the Wellman Steel & Iron Co., has ordered a complete shut-down of that big plant. All the clerks and salaried officials have been notified that there is no longer any necessity for their services. An effort will be made to sell the plant. The investment aggregates over $1,800,000."

Buffalo Furnace, at Buffalo, N. Y., is doing particularly good work. In the week ending April 21st it made 1,433 gross tons of pig iron, with a consumption of 2,093 pounds of coke to the ton of pig. The furnace is 80 feet high with an 18-foot bosh. Lake Superior ores and Connellsville coke are used. F. E. Bachman, formerly of Salem, Va., is the manager.

Messrs. Kohler Bros., The Monadnock, Chicago, have just secured the sole agency for a number of States for the railway generators and motors manufactured by the Walker Mfg. Co., of Cleveland, O. The States that Kohler Bros. control on these manufactures are Western Michigan and Indiana, Northern Illinois, and all of Wisconsin, Minnesota, Iowa, Missouri, Kansas, Nebraska, South and North Dakota, Montana, Wyo-

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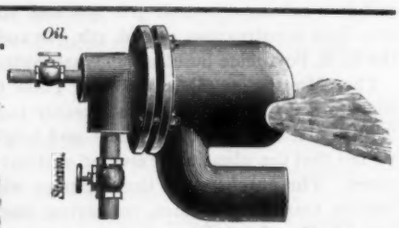

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ming and Colorado. With the large acquaintance that the Messrs. Kohler already have among the electrical trade and their experience in selling goods of this class, it is more than probable that the sales of the Walker Mfg. Co. will be largely increased in this territory by being placed in their hands.

The E. W Bliss Co. have lately moved their Chicago office and warerooms from No. 14 N. Canal St., into more commodious quarters at Nos. 100, 102 and 104 West Washington street, near Desplaines street, where they will continue to keep a representative line of presses, drop-hammers, shears and sheet metal machinery. Their Chicago office is still in charge of Mr. C. W. Ellsworth, formerly superintendent of the Chicago Stamping Co.

SLOSS furnaces at Birmingham are banking.

OHIO G. A. R.

Low Rates via Pennsylvania Lines for State Encampment at Canton.

On May 14 and 15, special low rate excursion tickets to Canton will be sold from ticket stations on the Pennsylvania Lines in Ohio account the state encampment G. A. R. Tickets will be good on all regular trains those dates and will be valid returning until May 20, inclusive. For details, apply to nearest Pennsylvania Lines ticket agent.

To Springfield at Reduced Rates via Pennsylvania Lines. On May 21st and 22d Excursion Tickets to Springfield, account the convention of the Grand Lodge Knights of Pythias of Ohio, will be sold at reduced round trip rates via Pennsylvania Lines; return coupons valid May 25th, inclusive.

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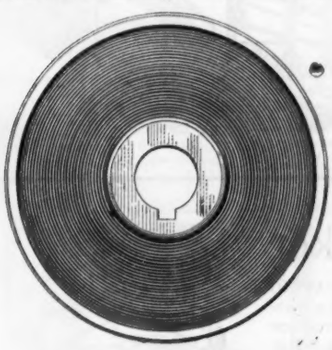
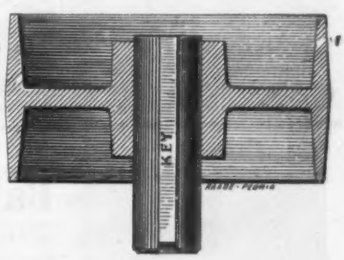
A new patented process for making castings economically and accurately, saving labor on boring, drilling, key-seating, and all machine work. We guarantee this compound to turn out finished work at one-fifth the cost of the old process. It has no equal in babbitting solid boxes.

OUR PATENT PROCESS EXPLAINED.

Instead of the present process of using a sand core, we use a metal core made of cold rolled steel shafting of the same size as the shaft on which the casting is intended to be run or used, turning out the castings ready for use, thereby saving from 50 to 75 per cent. on the dollar in machine finishing labor, such as boring, drilling, key-seating, feathering, etc., required when the sand core is used. This Metal Core before used, is coated by dipping it in our Compound, which prevents the molten metal fron adhering to the core, and also prevents all chilling, blowing, straining, cracking, etc., of the iron or casting.





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Pulleys of all sizes, gear and sprocket wheels, car wheels of every description can be manufactured at a greatly reduced cost by using this compound One gallon will coat or cover 500 square feet or 2,500 running feet of ¾ shafting. On this basis can be figured the total saving, which, of course, will depend largely on the size of the work being done and the size of core used, etc.

One gallon will turn out 20,000 common sized pulleys, saving on this work in machine labor alone, over $300.

The Metal Core may be used repeatedly, becoming better every time it is used, saving the re-making of sand cores and therefore making the cost of moulding less. To any one desirous of testing our compound, we will send a quart or half gallon can on approval, 30 days.

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Business Opportunity

Wanted a man with from $15,000 to $20,000 to invest in a good paying manufacturing business, with or without active participation in the management. This business is open to full inspection, and is old and well-established, with a good paying trade.

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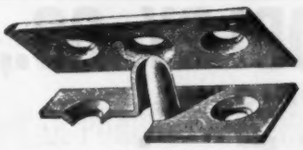

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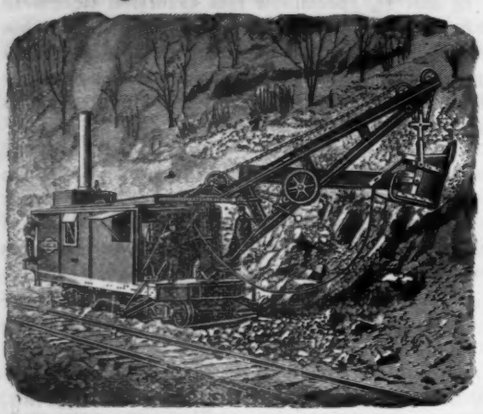

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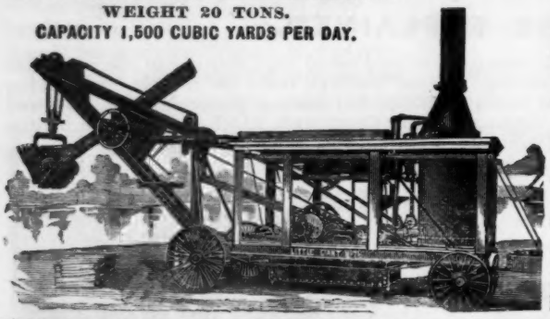

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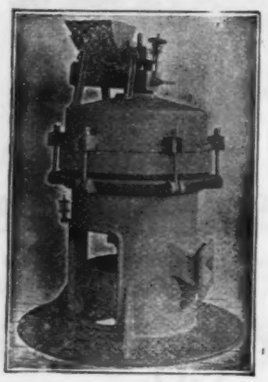

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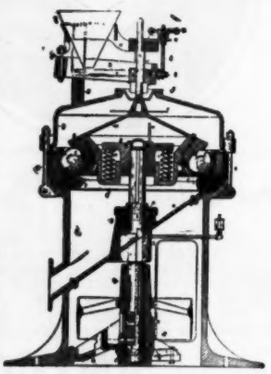

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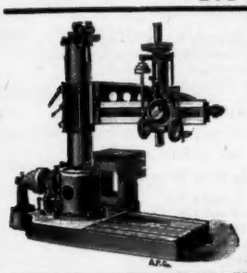

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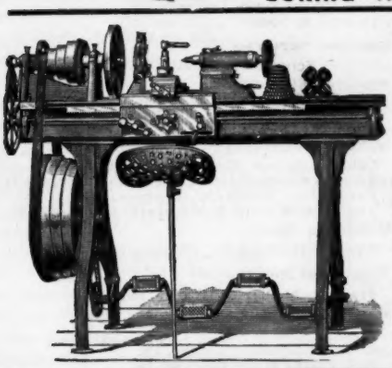

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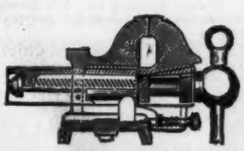

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30 set light car or truck wheels and axles 3′ gauge, flanged wheels 9″ dia., 2″ face, axles 1½″ dia., with box for axles, all new and in good condition, each	3.50

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One horizontal slide valve engine, cylinder 7″x12″ second-hand, first-class condition,	125.00
One 8″x12″ horizontal Erie City Iron Works center-crank engine, second-hand but in good condition, complete with governor	160.00

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One screw cutting lathe, 22″ swing, 8′ bed, second-hand,	125.00
One Sturtevant exhaust fan No. 21, suction pipe 16″ dia., second-hand,	50.00
One Sturtevant pressure blower No. 4, with 38′ of 12″ pipe made of No. 14 iron for same, also elbow 8′ radius, second-hand,	60.00
Two Root pressure blowers No. ½, second-hand, each	25.00
Eight ⅜″ steel shells 12′ long, 6′ 6″ outside dia., each with oval dome 22″x30″x24″. They are just as good as new. Price 1¼c per lb.	

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Southern Coke No. 2 and No. 1 Soft	9 25@ 9 50
Hanging Rock Coke, No 1	12 00@ 12 50
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 00
Tennessee Charcoal No 1	14 00@ 14 50
Jackson County Stone Coal No 1	14 50@ 16 00
Southern Coke, Grey Forge	8 75@ 9 00
" " Mottled	8 50@ 8 75
Standard Alabama Car Wheel	16 25@ 17 25
Tennessee " "	15 50@ 16 00
Lake Superior " "	16 00@ 16 50
BUFFALO (reported by Rogers, Brown & Co.)	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$11 75
No. 2 Foundry Strong Coke Iron Lake Superior Ore	11 25
Ohio Softener No. 1	11 75
Jackson Co. Silvery No. 2	15 50@ 17 00
Lake Superior Charcoal	14 75
Tennessee Charcoal	15 50
Southern Soft No. 1	11 00
Southern Soft No. 2	10 00
Alabama Car Wheel	16 00@ 17 50
Hanging Rock Charcoal	18 50
LOUISVILLE (reported by Geo. H. Hull & Co.)	
Southern Coke No. 1 Foundry	$10 25@$10 50
Southern Coke No. 2 Foundry	8 75@ 9 25
Southern Coke No. 3 Foundry	8 50@ 8 75
Gray Forge	8 00@ 8 50
Southern Charcoal No. 1 Foundry	12 50@ 13 50
Car Wheel	15 00@ 15 50
Spathite	11 25@ 11 75
ST. LOUIS (reported by Rogers, Brown & Meacham):	
Southern Coke No 1	$10 75@$11 00
Southern Coke No. 2	9 75@ 10 00
Southern Coke No. 3	9 50@ 9 75
Southern Gray Forge	9 00@ 9 25
Southern Charcoal No. 1	15 00@ 16 00
Missouri Charcoal No. 1	12 00@ 12 50
Ohio Softeners	14 50@ 15 00
Lake Superior	16 50@ 17 00
Southern	17 00@ 17 50
Connellsville Coke, St. Louis	4 50

OLD RAILS AND SCRAP METAL.

[Prices paid by mills.]

	GROSS TONS
Old iron rails	$12 50
Old steel rails	10 00
	NET TONS
No. 1 R. R. wrought scrap	$ 9 50
No. 1 wrought scrap	9 00
No. 1 Machine cast scrap	8 50
Iron axles	15 50
Axle turnings	8 00
Wrought turnings (free from cast)	6 75
Cast borings	5 00
Uncut wrought iron boilers	3 00
Steel boiler plates	8 00
Grate bars	4 00
Pipes and flues (clean)	7 00
Tank iron	6 75
Hoop and band iron	5 00
Sheet iron	5 00
Wrought drillings	6 50
Malleable iron	7 50

Frank P. Cady, Pres. and Supt.
Geo. H. Bowler, Sec'y and Treas.

THE CADY MFG. CO.

283 W. River St., CLEVELAND, O.

WIRE FORMING MACHINES.

Power Presses, Dies, Drop Hammers, Punches and Shears, Special Machinery, Wire Cutters and Straighteners.

J. A. FAY & CO.

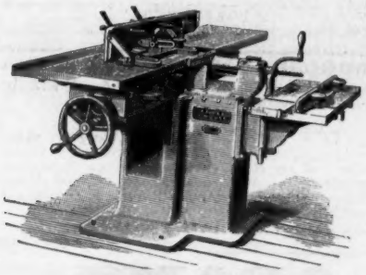
286 to 306 W. Front St.,
CINCINNATI, OHIO,
U. S. A.

WOOD-CUTTING MACHINERY
FOR ANY PURPOSE.

MAKERS, INTRODUCERS AND ORIGINATORS.

PATTERN AND FLASK MAKING MACHINERY, ETC., SUPPLIED.

The latest and most advanced ideas for fast, perfect and reliable productions.



NO. 2 VARIETY WOOD-WORKER.

The infinite variety of work performed by this machine has given it the position as the most useful one in existence for the working of wood. It is simply invaluable, for it is capable of almost every operation known to the art.

THE LONG LINE OF AWARDS, FROM 1851 DOWN TO THE "GRAND PRIX" AT PARIS, 1889, HAS BEEN ADDED TO BY THE CAPTURE OF THE "GRAND HONORS" AT THE WORLD'S FAIR, CHICAGO, 1893.

PERFORATED METALS

OF ALL KINDS FOR
MILLING MINING AND AGRICULTURAL MACHINERY,

PERFORATED IRON, STEEL, COPPER, BRASS, TIN, ZINC, LEAD, ETC., TO ORDER.
LARGE AND VARIED ASSORTMENT OF SIZES. CORRESPONDENCE SOLICITED.

THE ROBERT AITCHISON PERFORATED METAL CO.,

OFFICE, ROOM 510 265 TO 269 DEARBORN STREET, CHICAGO, ILL. WORKS SOUTH CHICAGO.

Horse AND Mule Shoes

SHEETS, BARS, SLABS AND BILLETS.
Light Sheets for TINNING AND PERFORATING a Specialty.
Geo. H. Sibell & Co., 614-218 La Salle St., Chicago.

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DIXON'S PERFECT LUBRICATING GRAPHITE.
The most Marvelous Lubricant Known.
Used Dry, or Mixed with Water, Oil or Grease
NOT AFFECTED BY HEAT, COLD, STEAM OR ACIDS.
An Interesting and Instructive Pamphlet will be sent Free of Charge.
JOS. DIXON CRUCIBLE CO. Jersey City, N. J.

IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g,
CLEVELAND, OHIO.

Trade Mark Patented.

ORDER DIRECT FROM THE
Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. mill)	1.20c@1.30c
Angles	1.25c@1.35c
Tees	1.35c@1.45c
Universal Plates	1.25c
Sheared Plates	1.35c

MERCHANT IRON AND STEEL.

[List prices out of store.]

Flat Bar.

1¼ to 4 by ⅜ to 1 inch	1 30
4½ to 6 by ¾ to 1 inch	1 35
1¾ to 6 by 1⅛ to 2 inch	1 50
1¼ & 1⅜ by ⅜ to ¾ inch	1 35
1 & 1⅛ by ⅜ to ¾ inch	1 40
⅝, ⅜, ⅞, by ⅜ to ⅝ inch	1 50

Round and Square.

1 to 1⅞ inch	1 30
2 to 2¾ inch	1 40
2¾ to 3¼ inch	1 55
3⅜ to 4 inch	1 80
4¼ to 4½ inch	2 40
4¾ to 5 inch	2 60

Oval.

⅞ to 1¼ inch	1 50
⅝ to ¾ inch	1 50
½	1 70
⅜	1 90

Half Oval and Half Round.

1⅛ to 3 inch	1 85
⅞ to 1½ inch	1 65
⅝ to ¾ inch	1 90
½	2 05
⅜	3 15

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 40
1 to 1¾ by ¼ and 5-16 inch	1 45
¾ to ⅞ by ¼ and 5-16 inch	1 55
½ to ⅝ by ¼ and 5-16 inch	1 80

Hoop Iron.

1 7-16 to 4, No. 13, 14, 15 and 16	1 85
1 7-16 to 2, No. 17, 18 and 19	1 90
1 7-16 to 2, No. 20	2 00
1 7-16 to 2, No. 21	2 10
1 7-16 to 2, No. 22	2 20
1½ to 1⅝, No. 13, 14 and 15	1 90
1½ to 1⅝, No. 16, 17 and 18	1 95
1½ to 1⅝, No 19 and 20	2 00
1½ to 1⅝, No. 21	2 10
1½ to 1⅝, No. 22	2 20
15-16 and 1 inch, No. 13, 14 and 15	1 85
15-16 and 1 inch, No. 16, 17 and 18	2 00
15-16 and 1 inch, No. 19 and 20	2 10
15-16 and 1 inch, No. 21	2 20
15-16 and 1 inch, No. 22	2 30
⅞, No. 13, 14 and 15	2 10
⅞, No. 16. 17 and 18	2 20
⅞, No. 19 and 20	2 30
⅞, No. 21	2 40
⅞, No. 22	2 50
13-16, No. 13, 14 and 15	2 20
13-16, No. 16, 17 and 18	2 30
13-16, No. 19 and 20	2 40
13-16 No. 21	2 50
13-16, No. 22	2 60
¾, No. 13, 14 and 15	2 30
¾, No. 16, 17 and 18	2 45
¾, No. 19 and 20	2 55
¾, No. 21	2 65
¾, No. 22	2 75
11-16, No. 13, 14 and 15	2 55
11-16, No. 16, 17 and 18	2 60
11-16, No. 19 and 20	2 70
11-16, No. 21	2 80
11-16, No. 22	2 90
11-16, No. 23	3 00
⅝, No. 13, 14 and 15	2 60
⅝, No. 16, 17 and 18	2 70
⅝, No. 19 and 20	2 80
⅝, No. 21	2 90
⅝, No. 22	3 00
⅝, No. 23	3 10
9-16, No. 13, 14 and 15	2 80
9-16, No. 16, 17 and 18	2 90
9-16, No. and 20	3 00
9-16, No. 21	3 10
9-16, No. 22	3 20
9-16, No. 23	3 30
7-16 and ½ inch, No. 13, 14 and 15	3 00
7-16 and ½ inch, No. 16, 17 and 18	3 10
7-16 and ½ inch, No. 19 and 20	3 20
7-16 and ½ inch, No. 21	3 30
7-16 and ½ inch, No. 22	3 40
7-16 and ½ inch, No. 23	3 50
7/16, No. 13, 14 and 15	3 50
7/16, No. 16, 17 and 18	3 60
7/16, No. 19 and 20	3 70
7/16, No. 21	4 00
7/16, No. 22	4 10
7/16, No. 23	4 25

Light Band.

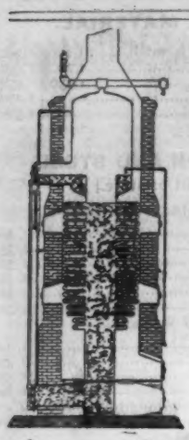
1½ to 6 by ⅛ to 3-16 inch	1 60
1½ to 6 by Nos. 11 and 12	1 65
1 to 1¾ by ⅛ to 3-16 inch	1 65
1 to 1¾ by Nos. 11 and 12	1 70
⅞ and 13-16 by ⅛ to 3-16 inch	1 80
⅞ and 13-16 by Nos. 11 and 12	1 85
¾ and 11-16 by ⅛ to 3-16 inch	1 90
¾ and 11-16 by Nos. 11 and 12	1 95
⅝ and 9-16 by ⅛ to 3-16 inch	2 05
⅝ and 9-16 by Nos. 11 and 12	2 10
½ by ⅛ to 3-16 inch	2 20
½ by Nos. 11 and 12	2 25

Wagon Box Iron.

⅞ inch, beveled edge, by Nos. 11 and 12	1 80
⅞ inch, " " " " 13 and 14	1 90
¾ inch, " " " " 11 and 12	1 95
¾ inch, " " " " 13 and 14	2 15

Sheet Iron.

No. 10	1 85
No. 12	1 90
No. 14	1 95



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WATER TUBE BOILER.

This Boiler is absolutely safe from explosion. Gives as much steam from the waste heat as any boiler made. Easy of access for cleaning and repairs. Furnishes perfectly dry steam. Occupies little ground space. Economical in first cost. Send for complete circulars giving list of users and testimonials, one of which is printed below.

The Falcon Tin Plate & Sheet Co., }
NILES, O., Aug. 18, 1893. }

Chas. P. Adams, Esq.

Dear Sir: The three boilers of 225 H. P. each which you furnished us are working in every way satisfactory. We consider them as good steamers as any we have ever used. Up to the present time have spent nothing on them for repairs. Very respectfully,

THE FALCON TIN PLATE & SHEET CO.,
By Warner Arms, Pres't.

C. P. ADAMS.

807 The Cuyahoga, - CLEVELAND. O.

CLEVELAND ROLLING MILL CO.,

CLEVELAND, - OHIO,

—MANUFACTURERS OF—

BESSEMER AND OPEN-HEARTH STEEL,

Blooms, Billets, and Slabs, Steel Rails, Steel Beams, Channels and Angles. Steel Forgings, Bar Spring, and Sleigh Shoe Steel. Steel Wire of all kinds. Barbed Wire, Iron and Steel Plates, Galvanized and Black Sheet Iron and Steel Corrugated Iron Roofing.

MAKE YOURSELF A **Mechanical Engineer or Draughtsman;** or qualify to take charge of, or to superintend the manufacture of machinery by devoting your idle hours to **Home Study** by the method of **THE CORRESPONDENCE SCHOOL OF MECHANICS,** Scranton, Pa. To begin, students need only know how to read and write. Moderate Charges. Send for FREE Circular.

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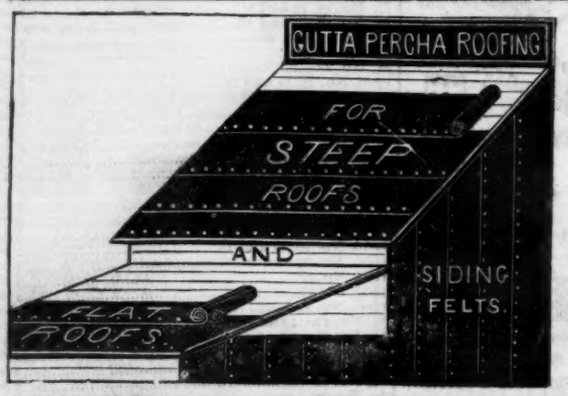
We are the only Steel Roofing Co. awarded Medal and Diploma for **PATENT CAP ROOFING** at World's Columbian Exposition. We are also large manufacturers of all styles of METAL ROOFING, SIDING, CEILING, ETC. Send for Catalogue and Price List. Mention this paper.

SYKES IRON & STEEL ROOFING CO., • Chicago and Niles, O.



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Elastic Paint for Metal Roofs and Siding only 60c. per gallon in bbls.

Send for Catalogue and references from hundreds of the largest Manufacturing firms in the United States. Also Water Proof Siding and Sheathing Paper.

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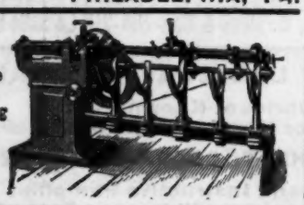
JOHN ADT & SON,
New Haven, Conn.

Builders of Machinery for Hardware Manufacture.

Automatic Wire Straightening and Cutting Machines, Butt Milling Machinery, Butt Drilling Machinery, Riveting Machines, Foot Presses, Screw Cutters, Etc.



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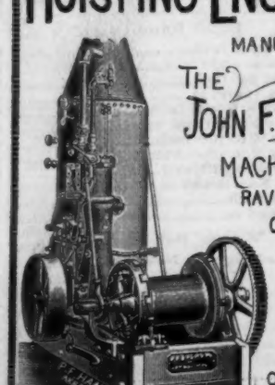
MANUF'D BY

THE JOHN F. BYERS MACHINE CO., RAVENNA, OHIO.



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BERGER BROS. TINNERS' HARDWARE and ROOFERS' SUPPLIES.

The best Eave Trough Hangers and Pipe Fasteners on earth. Berger's Long Eave Gutter. Pipe Hooks and Fasteners of every description, Also Ridging, Crestings, Finials, Registers and Ventilators. Don't buy until you have our price. Samples and catalogue free.

237 Arch St., PHILADELPHIA, PA.

No. 15-17	2 05
No. 18	2 20
No. 20	2 30
No. 22-24	2 40
No. 25 26	2 50
No. 27	2 60

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 60
Shell	1 85
Flange	2 10
Marine Flange	2 35
Fire Box	3 35

Above includes plates 90 inches wide.

90 to 96 in. wide	¼c. ℔. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1¼c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔s.
1 to 2 in, inclusive	08
9-16 to ½ in. "	08½
7-16 to ⅜ and 2¾ to 3 in	09
3⅛ to 4 in	09½
⅜ to 11-16 and 4½	10
⅝ to 6 in	10½
¼ to 9-32 and 6¼ to 7 in	11
3-16 in	13

Flats.

	cts. ℔s.
2 to 9-16 in. wide by 2 to ⅝ thick	8

Bessemer and O. H. Steel.

Machinery	base price,	1 80
Tire	"	1 85
Spring	"	2 20
Sleigh Shoe	"	2 20
Toe Calk	"	2 05
Cutter Shoes, tapered and bent	"	2 45

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 70
Bridge ½, ⅝, 11-16 and ¾ inch diam	3 40

MACHINERY SUPPLY MARKET.

Anvils.

American	℔ 9@10
Wright's	℔ 12

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&5
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 35
Horton's Universal	dis 40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

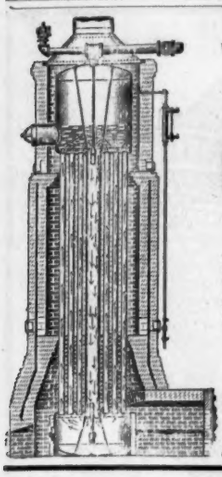
Cast Steel	℔ 3½
Iron, steel points	℔ 1b 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1⅛"	dis 50&10
Morse Taper and Straight Shank Larger than 1⅛"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 46 gr.	150 gr.	Flour, C. F F. FF.
Kegs, ℔	4½c	5 c	2¼c
½ kegs ℔	4¾c	5¼c	2¾c
¼ kegs ℔	5 c	5½c	3 c
10 ℔ cans, 10 in case	6 c	6¼c	5 c
10 ℔ cans less than 10	10 c	10 c	7½c



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SOLE BUILDERS OF THE

Cook Patent Water Tube Boiler

THE ONLY PERFECT WASTE-HEAT BOILER.

No incrustation.
Generates the greatest amount steam with least amount heat.
Repairs reduced to a minimum.
Can be used equally as well for direct firing or with natural gas.

WE ARE ALSO BUILDERS OF

HORIZONTAL, TUBULAR, AND FLUE BOILERS, OIL TANKS AND WATER STAND PIPES.

☞Estimates furnished promptly on receipt of specifications.

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MINING MINERAL AND TIMBER LANDS.

Municipal Bonds, Large Tracts of Florida
Farm and City Mortgages, Phosphate and
Short Time Paper. Hammock Lands.

EXAMINATIONS AND REPORTS MADE. ☞Correspondence Solicited.

Moffet Portable Drill

UNSURPASSED AS A REAMER.

Weighs 48 pounds and drills from ⅜ to 2 inches diameter.

Runs with Steam or Compressed air.
Will Work in Any Position.
An Economical Substitute for Rachet Drilling.
Send for Circular.

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MANUFACTURERS OF

Standard Tubular, FireBox, Vertical and Submerged Tube Steel

BOILERS

For Marine, Stationary, or Portable use.

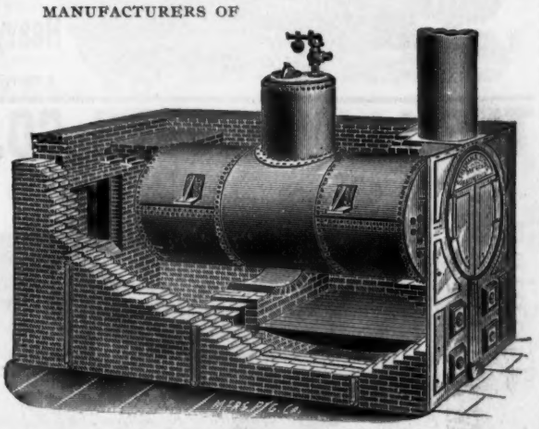
ALSO OF

TANKS

OF ALL KINDS.

Smokestacks, etc., - - - - Grey Iron Castings.

Write for Prices and Terms.



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SIMPLE, STRONG AND CONVENIENT TO HANDLE.

All parts held together by a pin inside of box; no losing of pawls or rollers. It can be adjusted quickly and be bought cheap. Both large and small sizes. Write for prices and terms. Address,

J. STAUFFER, 1630 East 3d St., Dayton, O.

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 50@50&5
H. H. Barton.....dis 50@50&5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 60&10
Hamden.....dis 60&10@70
Cyclone.....dis 60@60&10

Files.

Arcade.....dis 60&10@60&10&10
Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
McClellan.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs.....15c
" " " " over 5 lbs.....12c

Jack Screws.

Illinois Bolt Co. list.....dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3½
Hexagon	15½	11½	8½	6	5¼	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ¾ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887.....dis 85
Standard Penny Nails, ¾ keg card rate
Car lots.....$1.20
Less than car lots...$1.35

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60: No. 2, $4.00; No. 3, $4.40 ¾ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....¾ lb 9@10
Russia " " .....¾ lb 14
Italian " " .....¾ lb 13@19
Plumbago Piston.....¾ lb 40
Peerless.....¾ lb 60
Morrison's " .....¾ lb 45
Square Flax " .....¾ lb 50
Sheet Rubber.....¾ lb 12&24
Excelsior Rubber.....¾ lb 48
Rainbow.....Full Rolls.....45c ¾ lb; Less than Full Rolls, 50c ¾ lb
Eclipse Gasket.....¾ lb 75

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 50
Medart Pulleys.....dis 50
Split Wood Pulleys.....dis 55@60

Rivets.

Iron, Thousand, list November 17.....dis 50&10@60
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50&10@60
Copper.....dis 50@50&10

Saws.

Disston's Circular.....dis 40&10
" Band.....dis 25
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Diston's.....dis 30
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws.....dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....70c per ft
" Dexter Cross-cuts.....50c "
" Diamond " .....30c "
" Tuttle Tooth Cross-cuts.....25c "
" One-man Cross-cuts.....32c "
No. 1 Handles.....23c per pair
No. 6 " .....16c "
Excelsior Saw Tools.....$6 per doz
Derfection " .....$15 "
Petroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list.....dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 55
Pulley Taps.....dis 40

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

New List, Jan. 18, 1884

Brass	dis 30
Copper	dis 40
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ℔ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis'40

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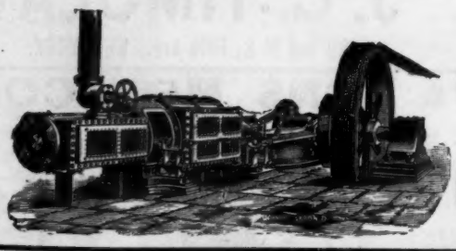

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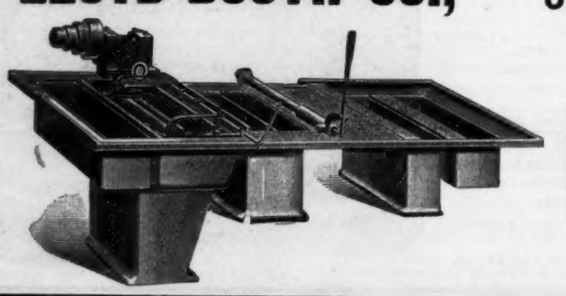

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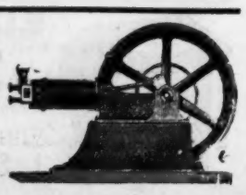

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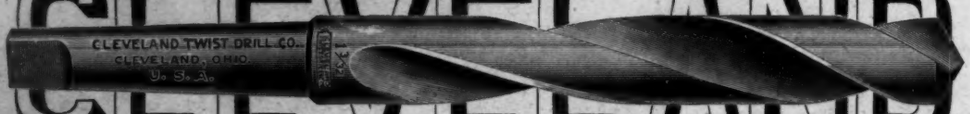

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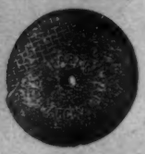

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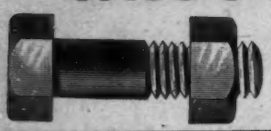

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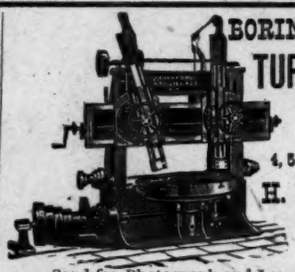

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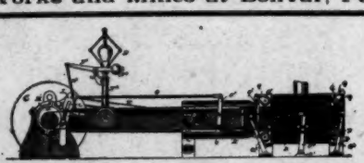

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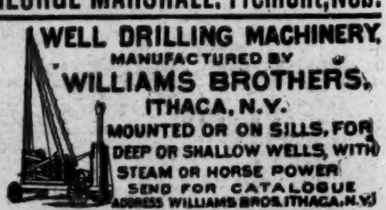
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